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ABSTRACT

This second volume of a two volume annual report provides details on the research, teaching, and communication activities of the Program on Information Technologies and Public Policy from September 1974 through September 1975. Projects included a census of the communications industry, the composition of a bibliography of informational science materials, and studies in areas such as: electronic fund transfers, educational technology, cable television, shared versus stand-alone computers, Europe's computer industry, the specialized carrier market, library technology, privacy and the Buckley amendment, management systems, and governmental regulation of informational systems. The cost of informational technology was investigated with special reference to telephones and mail delivery. Also a massive project was initiated to map the international flow of computer data. Lists are provided of the year's faculty seminars and of new staff publications. (EMH)

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A Perspective on Information Resources

THE PROGRAM YEAR
IN REVIEW

Annual Report 1974-75
Volume Two

PROGRAM ON INFORMATION
TECHNOLOGIES AND PUBLIC POLICY

Harvard University
Cambridge, Massachusetts

U S DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

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THE PROGRAM YEAR IN REVIEW

ANNUAL REPORT 1974-75
VOLUME 2

Available on request is Volume 1 of the annual report for 1974-75, *Program: Scope, Aims and Practices*, a companion booklet.

PROGRAM ON
INFORMATION TECHNOLOGIES
AND PUBLIC POLICY
OCTOBER 1975

HARVARD UNIVERSITY
CAMBRIDGE, MASSACHUSETTS

Act as men of thought. Think as men of action.—Henri Bergson

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Bank of America
William Bingham Foundation
First National Bank of Chicago
Retail Credit Company

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CORE PROGRAM STAFF

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PROGRAM DIRECTOR

Anthony G. Oettinger is Gordon McKay Professor of Applied Mathematics, Professor of Information Resources Policy, and a member of the Faculty of Public Administration at Harvard University. He is currently director of the Harvard Program on Information Technologies and Public Policy and has served as chairman of the Committee on the Computing Center and as a Research Associate to the Program on Technology and Society.

He is Chairman of the Cable Television Commission of the Commonwealth of Massachusetts. He was an advisor to the subcommittee of the Committee for Economic Development that prepared the report *Broadcasting and Cable Television: Policies for Diversity and Change*, issued by CED in April, 1975. Since 1956, he has served as a consultant to Arthur D. Little, Inc., on the application of information technologies to many industries; he served as a principal consultant to the ADL team that prepared *The Consequences of Electronic Funds Transfer — A Technology Assessment of Movement Toward a Less Cash/Less Check Society*, a report for the National Science Foundation issued in January 1975.

He has been president of the Association for Computing Machinery (1966-68) and a consultant to the Office of Science and Technology, Executive Office of the President of the United States (1961-73). He is a Fellow of the American Academy of Arts and Sciences, the American Association for the Advancement of Science and the Institute of Electrical and Electronics Engineers.

As chairman of the Computer Science and Engineering Board of the National Academy of Sciences (1967-73), he led the preparation of NAS reports on *A Technical Analysis of the Common Carrier/User Interconnections Area* (Lewis S. Billig, Project Director), *Databanks in a Free Society: Computers, Record Keeping and Privacy* (Alan F. Westin, Project Director) and on *Libraries and Information Technology—A National System Challenge* (Ronald L. Wigington, Project Director).

He is the author of *Automatic Language Translation: Lexical and Technical Aspects*, of *Run, Computer, Run: The Mythology of Educational Innovation* and of numerous papers on the information technologies and their uses, including, most recently, *Elements of Information Resources Policy: Library and Other Information Services*, a report of the Program to the National Commission on Libraries and Information Science.

EXECUTIVE DIRECTOR

John C. LeGates is Executive Director of the Program and Research Fellow in Information Resources Policy. His experience prior to joining the Program has been in the development of educational and medical applications of computing.

At EDUCOM, he was the executive director of the Educational Information Network (EIN) and the author of several articles on computer networking. Earlier, as Vice President of Cambridge Information Systems, Inc., he was director of the technical staff, and responsible for the company's nationwide marketing efforts. He also directed the development of the Massachusetts General Hospital Integrated Information System.

At Computer Advisory Services to Education, Inc., he was vice president and director. At Bolt, Beranek and Newman, Inc., he was responsible for exploring the potential of the TELCOMP language in education.

His studies were in mathematics (Harvard) and philosophy (Yale).

1

INTRODUCTION AND SUMMARY

This booklet reports on the details of the research, teaching, and communication activities of the Program on Information Technologies and Public Policy from September 1974 through September 1975, the third year of its existence. The Program's scope, purpose, audiences, procedures and structure are described in a companion volume *Program Scope and Practices*, which is briefly summarized below.

Program Scope

Information is as vital a resource as energy or matter, although it fills our heads and the memories of computers instead of warming us or shielding us from the elements; its characteristics are unique and ill-understood, but it is a commodity that pervades all organized activity.

Some of the members — public and private — of the present constellation of information industries are illustrated in Figure 1. A common trait of the listed activities is that, in each case, information is the primary or sole output. Excluded from the table, but important as information users, are all the industries where information processing, however important, is incidental to producing such primary outputs as cars or haircuts.

Alterations in the relations between oil and coal in the energy industries, or between trains, boats and pipelines in the transportation industries have large implications for public policy. Likewise, changes in the relations among information industries can have a similar impact on the public.

The public has a vital interest in the rapid and fundamental changes occurring in:

- how information systems perform;
- what controls information flow;
- and on what terms that information is made available to users to meet their needs for the knowledge and understanding required to participate fully in our society.

Of central importance is the question of who holds how much power over whom.

Today, major political, economic and technological factors are altering or eliminating the historic barriers between information industries and making new alternatives available to information users. What happens to one information industry strongly affects not only all the others but also the public generally. These relationships are increasingly recognized but little is known about their effects on either the industries or the public. The Program's approach to these basic policy questions will be found in Figure 2.

The Program's Purpose

The purpose of the Program is to develop an understanding of information systems and to use that understanding to illuminate public discussions of information policy.

Policy is viewed as the outcome of a process much broader than the formal workings of regulatory bodies. It frequently involves negotiation and compromise among the involved parties, including diverse interests inside and outside government. Fundamental to the Program's activities is the plain premise that knowledge is better than ignorance. Consequently, the Program aspires to supply background information to all the major players.

Our Procedures

The Program examines the middle term, two to ten years ahead, in which the important issues are close enough to be seen but far enough away to be affected by inquiry.

Research is conducted by combining traditional academic methods with an affiliation and review procedure that serves both to aid research and to spread findings.

Our affiliates are a network of working relationships with corporations, government agencies, and individual experts. These relationships are heavily used to supply data and expertise to the Program research. Much of the key information in the Program's subject area is not available in the academic setting, and is

The Information Industries
Approximate Gross Revenues.

FIGURE 1.

Estimates gathered from U.S. government, trade associations and other sources; all figures in current dollars; double counting not eliminated.

	(In billions of dollars)			
	1970	1971	1972	1973
Broadcast television	2.8	2.8	3.2	3.5
Cable television	0.3	0.3	0.4	0.5
Broadcast radio	1.1	1.3	1.4	1.5
Telephone	18.2	20.0	22.4	25.5
Telegraph	0.4	0.4	0.4	0.5
Specialized common carriers	0.0	0.0	0.0	0.0
Satellite carriers	0.1	0.1	0.1	0.1
Mobile radio systems	2.0	2.2	2.4	2.6
Motion pictures	3.8	3.8	NA	NA
Organized sports, theaters, etc.	4.4	NA	NA	NA
Computer software suppliers Computer service suppliers	1.9+	2.4+	3.0+	3.7+
U. S. Postal Service	6.3	6.7	7.9	8.3
Private information delivery services	0.7+	0.8+	1.0+	1.2+
Newspapers; wire services	7.0	7.4	7.8	8.3
Periodicals (including newsletters)	3.2	3.4	3.5	3.7
Business consulting services	0.9	1.1	NA	NA
Advertising	7.9	7.6	NA	NA
Marketing	32.4	37.7	41.3	43.4
Brokerage industries	40.6	47.4	54.4	NA
Book publishing and printing	3.4	3.7	3.9	4.1
Libraries	2.1	NA	3.6	NA
Schooling	70.0	76.3	83.2	89.5
Research and development	26.5	27.3	29.2	30.6
Federal information institutions				
Census Bureau	0.1	0.1	0.1	0.1
National intelligence community	4.0+	NA	NA	NA
National Technical Information Service	0.0	0.0	0.0	0.0
Social Security Administration	1.0	1.2	1.3	1.4
County agents	0.3	0.4	0.4	0.5
Banking and credit	61.1	68.9	76.9	NA
Insurance	92.6	103.5	121.4	NA
Legal services	8.5	9.6	NA	NA
U. S. Gross National Product	977.1	1,055.5	1,155.2	1,294.9

gathered with the help of the affiliates through the Program review procedures.

The review procedures involve a repeated sending of research documents to a variety of experts for criticism. Each project is scrutinized while being planned and then several times during the course of the work. Reviewers are selected who represent the different scholarly or professional disciplines which can bear on the work, and also the different parties who might have a stake in the outcome, including competing firms, competing industries and their clients.

The Program makes its findings known to:

- The general public;
- The appropriate government agencies, including Congressional committees;
- The leading corporations in the computer/communications/information field and their clients;
- Selected private individuals, professionals, and scholars.

We do not recommend policy; academic recommendations seldom carry much force and there is seldom only one possible policy. Instead the Program wishes to inform the major players of the following:

- What are the background data?
- Who are all the players?
- What are the forces on them?
- What are the trends?
- What are the policy options?
- What are the likely consequences?

Each final report is to be written in plain English. If the report is lengthy, there is a short summary.

The affiliation and review mechanism is a major tool for making the Program's findings known. Other means are also used. These include publishing reports, preparing journal and magazine articles, making presentations at conferences and lecture series, and giving testimony at hearings before government agencies.

Program Structure and Finance

The Program comprises two parts: The Core Program and the Projects. The Core Program activities set and sustain the activities of the Program as a whole. The Core Program establishes priorities, defines new projects, maintains communications, and fosters coherence and synthesis in analyzing the problems of information policy. Each project is devoted to a particular research topic or set of topics, and follows a plan prepared within the Core Program.

The Core Program is supported by the affiliates, in such a way that no supporter supplies a majority, or even a strong minority of the money. Funds are accepted only on a "no strings attached" basis.

Each project must seek funding for itself once the plan has been prepared within the Core Program. This constantly subjects the Program to the acid test of the marketplace.

RESEARCH 1974-75

The individual research projects described below vary greatly in form, focus and style. Some involve undergraduates, others involve well-known scholars. Some have been completed, others hardly begun. The summaries below are intended only to provide a brief sketch of each project. The larger categories are fluid. There are relations across categories as well as within them. The Program welcomes inquiries and suggestions concerning any of its research projects.

BASIC INFORMATION ON THE INFORMATION INDUSTRIES

Characterizing the vast and varied information resources is a fundamental task of the Program. Just as almost all our research contributes to this task, the efforts described below make an important contribution to almost all our other research.

A Rough Census of the Information Industries

Warren Lavey has made a rough census of the information/communication industries, with preliminary attempts at comparisons in size. It covers television (broadcast and cable), radio, telephone, domestic telegraph, the Postal Service, newspapers, book publishing and printing, periodicals, motion pictures, and computer services and software. Figure 1 on page 8 is an update of his findings. Lavey's full report has been issued as a Program Publication under the title *Toward a Quantification of the Information/Communications Industries.*

Lavey was invited to continue this research at the Institute for Computer Sciences and Technology of the National Bureau of Standards during the summer of 1974, but other research commitments, also growing out of Lavey's work at the Program, made this impossible. He completed his combined bachelor's and master's degree program *summa cum laude* in June 1975. He is continuing his studies at Cambridge University, England, on a Rotary Foundation Graduate Fellowship.

Carol Weinhaus of the Program's staff, is continuing this project, extending Lavey's snapshot data into time series and developing descriptions of additional industries. This work is available to the Program's researchers and has contributed to many of its publications, but it has not yet been published separately.

Bibliographic Tools

Carol Weinhaus has edited bibliographic contributions by many Program participants and colleagues in other organizations into the working paper *Bibliographic Tools*, first issued in January 1974, and most recently updated in April 1975.

The current edition is in two volumes. Volume 1 has four sections: a reference guide, an annotated bibliography, a guide to background articles on science and technology, and a guide to audiotapes and videotapes. Volume 2, subtitled *Legislative Guide*, contains guides to federal agencies and departments, and also sections reprinted from Don R. LeDuc (University of Wisconsin, Madison, Wisconsin) "Inside the FCC: a Guide for Information Seekers," and from LeDuc and Erwin Krasnow (Kirkland, Ellis and Rowe, Washington, D.C.) "Broadcast Legal Documentation: A Four-Dimensional Guide."

This document has proved valuable as a research tool and as an aid to stu-

dents in Program-affiliated courses. Copies have been requested by several organizations outside the University.

A small, specialized Program library, comprising government documents, specialized reports not published conventionally, and other fugitive materials, is also being gathered by Weinhaus.

JOCKEYING FOR MARKETS AMONG INFORMATION SYSTEMS

Much of the Program's research has focused on how information systems are being shaped and by whom, and on what are the possible outcomes of this jockeying and their effects on the users and suppliers of information and information technologies.

Electronic Fund Transfers as Communications or Finance?

Money talks, and not only in terse proverbs. A substantial proportion of the total information flow consists of financial transactions of one kind or another. Forty per cent of all mail is checks, bills, purchase orders, and the like, but the area of most rapid development in financial communications is electronic fund transfers.

Elements of electronic funds transfer systems already operating include automated tellers, customer-bank communication terminals, remote service units, satellite facilities, and others. These devices have been compared to mailboxes or telephones by the U. S. Comptroller of the Currency. The Chairman of the Federal Communications Commission as well as the Postmaster General are named along with banking officials as members of the National Commission on Electronic Fund Transfers created by act of Congress in October 1974.

Daniel Prives spent the summer of 1974 on the staff of Federal Communications Commissioner Robert E. Lee studying the overlapping interests of the Federal Communications Commission and the Federal Reserve Board in a proposed national EFT system. When is the transmission of payments common carriage and when is it not? On what basis will these transmission and related data-processing functions be allocated and by what process? Will they go to private enterprises or to public agencies? What are the likely consequences of such choices for the public?

The resulting paper by Commissioner Lee, "Dialing for Dollars: Communications Regulation and Electronic Fund Transfer Systems," is in the Winter (1974-75) issue of the *Maryland Law Review*, Vol. 35, No. 1.

At present, electronic funds transfer systems are restricted to operate within a single state, often within a single bank or group of banks. Prives spent the summer of 1975 studying the various state efforts to regulate these systems. Most of the first batch of state legislation has dealt with the degree to which financial institutions may cooperate in this development. The State of Washington permits some institutions to share operation of EFT systems. Indeed, both Washington and Minnesota require certain financial institutions to share systems. Other states, like Nebraska, have passed laws that exclude certain financial institutions from shared systems.

Prives analyzed and compared these laws with four goals in mind:

O to classify the kinds of cooperative efforts permitted, required, prohibited, or not mentioned, and to determine whether these legal provisions depend on technological aspects—communication by wire, microwave, or mail—or on functional aspects—analogies to depositing, withdrawing or merely passing funds;

O to relate the state laws and regulations to the federal ones, to identify differences and possible conflicts;

O to relate the state laws to the state banking structures being regulated; cooperation among commercial banks can mean competition for savings institutions, for instance;

O to identify the consumer interests and other public interest considerations that will arise as EFT systems develop.

Prives, a philosophy graduate of Harvard College, is in the third year of a four-year program of the Harvard Law School and the Harvard Business School leading to a joint degree in law and business administration.

Information Technologies and Control Over Learning

Control of public education is one of the most potent of political issues, but quite different processes determine the information content of educational broadcasts, textbooks, and computer-assisted instruction. The commercial, legal, financial, and regulatory frameworks of these educational media differ widely, as do the relationships among the participants in the flow of information from creator to user. Patterns of social control of information usage are strikingly dissimilar.

What changes may we expect in the relative usage of these media, whether in school or in less formal learning situations? How are these changes likely to affect control over learning? Who are the policy-makers and what are their options? What are the likely consequences of this situation for which learners? For which industries?

Paul DiMaggio, Irene Taviss Thomson and **Nikki Zapol** plan to compare books, broadcasts, and CAI materials aimed at American schoolchildren to develop an understanding of the extent to which differences in decision-making patterns in these media are reflected in the substance transmitted to learners.

How are decisions made to publish or produce these materials? How are materials selected by school systems? How do materials reach the learner? How are the materials used by teachers? How do these decisions affect one another in the marketplace and the political arena? How do private and government funds affect these processes? Preliminary findings in this area are presented in a Program working paper, "Information Technologies and Control Over Learning".

In their preliminary work, the authors have benefited from the advice and criticism of Laurence H. Tribe, a Professor of Law whose interest in how the choice of means for reaching desired ends can shape basic values of society was the original stimulus for this study. They have also had help from Paul Berman of the Law School, and from many people in broadcasting and in publishing.

DiMaggio, a sociology graduate of Swarthmore College, is a graduate student in sociology and co-chairman of the *Harvard Educational Review*. Thomson, formerly Lecturer in Sociology at Harvard is Assistant Professor of Sociology at Fairleigh Dickinson University and a consultant to the Program. She is the author of *Our Tool-Making Society* (Prentice-Hall, 1972); co-editor, with Everett Mendelsohn and Judith Swazey, of *Human Aspects of Biochemical Innovation* (Harvard University Press, 1971) and editor of *The Computer Impact* (Prentice-Hall, 1970). Zapol, on the Program staff since its beginning, and with eight years of professional experience including service as a consultant to the Academy for Educational Development, is now in her second year at Harvard Law School. She is co-author, with Tony Oettinger, of "Will In-

formation Technologies Help Learning", a study commissioned by Carl Kaysen for the collection, *Content and Context: Essays on College Education* (McGraw-Hill, 1973), which Kaysen edited for the Carnegie Commission on Higher Education chaired by Clark Kerr.

The Realities of Cable Television

The endemic problems of the CATV industry are analyzed by Anne W. Branscomb in her article, *The Cable Fable: Will It Come True?* which appears in the Winter (1974-75) issue of the *Journal of Communication*. She was formerly communications counsel for the TelePrompTer Corporation and she takes that firm's financial crisis of late 1973 as a case in point. She directs attention to blue-sky promises, unskilled personnel, lack of programming or new services, lack of venture capital, and overregulation by local, state and federal governments. Her proposals for new policy directions include cooperation with existing industries for developing new services; encouraging cross-investment by one industry in the development of another; divorce of control over content and conduit; more local and regional planning; and commitment of public funds for investment in cable hardware and software.

Branscomb, now vice president of Kalba Bowen Associates, Inc., was invited to discuss the cable industry before a Faculty Seminar February 4, 1974. A background paper for the presentation, *The TelePrompTer Syndrome and its Aftermath: Can Cable Fulfill its Promise?*, was passed through the Program's normal reviewing process. The complete article developed after the review, with its analysis of the structuring of the cable industry, complements Peter Shapiro's work on the specialized common carriers discussed on page 8.

Shared versus Stand-Alone Computing

The giant computer utility — a nationwide chain of computers linked to every home and office through remote-access terminals — has become a standard feature of technological forecasts. The smaller, stand-alone computer in every living-room has been relegated to the forecasters' Never Never Land along with the airplane once predicted for every garage.

Montgomery Phister, Jr., in a Program working paper, has examined these paired predictions on future computer use. Although computer utility development is proceeding, with certain cost and functional virtues apparent, Phister concludes that such systems also have special weaknesses, notably system inefficiency. Stand-alone computers offer the advantages of reliability, specialization of functions, and freedom from problems of communication. They are also dropping rapidly in price.

In his working paper, Phister describes the functions likely to be best suited to each type of computer, and makes cost and functional comparisons for a variety of conditions. His conclusion is that the small system is likely to become as widely used as the car, while the large computer utility will fail to develop.

Formerly Vice President and Manager, Computer Systems Division, at Xerox Data Systems, Phister spent the 1974 fall semester as a research fellow with the Program.

Europe's Computer Industry

In his teaching and research on manufacturing policy in industrial organizations at the Business School, Robert Hayes has developed a number of interesting cases in telecommunications manufacturing. A digest of his paper, *Europe's Computer Industry: Closer to the Brink*, presented at a Faculty Seminar on March 25, 1974, appears in the Summer 1974 *Columbia Journal of World Business*. He has also developed cases in manufactur-

Basic Policy Questions. **FIGURE 2.**

What are the implications for information users of jockeying among old and new information organizations for old and new information markets?

What are the likely effects on information users of increasing or decreasing competition among old and new information organizations?

How does the traditional mixture of private enterprises and public agencies serve information users? What would be the likely effects on users of shifting the allocation of any information functions from one industry or agency to another? From the public sector to the private sector or vice versa? From national to international control or vice versa?

How responsive are traditional patterns of governmental and other public intervention in information systems to the needs or demands of information users? What would be the likely effects of extending or curtailing intervention nationally? Internationally? What alternative patterns are available? With what likely effects?

What governs the nature and the rate of technological innovation in information systems; and with what likely effect on information users?

ing electronic components and consumer electronic goods. Hayes, a Professor of Business Administration, joined the Program's Executive Committee in 1973-74.

Public Policy and the "Specialized" Carrier Market

During his two years with the Program, Peter D. Shapiro studied the structure of the market for specialized, private-line telecommunications, such as the private telephone systems operated by nationwide firms and the high-technology data transmission systems like those operated by Microwave Communications, Inc. (MCI), or Telenet, Inc.

Conventional approaches to the making of telecommunications policy usually begin and end with the FCC. The Commission's regulations are seen as determining the market structure which, in turn, in this view shapes the performance of firms in the market. Shapiro finds the market structure far more complex, an interplay involving, to varying degrees, public policy, the strategies of firms, financing, technology, and the needs of telecommunications buyers.

Nor is public policy-making limited to the FCC. Shapiro also examines the roles of Congress; the Courts; the White House Office of Telecommunications Policy; the Department of Justice; state public utility commissioners and their National Association of Regulatory Utility Commissioners; and the government agencies responsible for procuring communications facilities, notably the General Services Administration and the Defense Communications Agency.

In Shapiro's view, the monolithic public-policy-maker is replaced by the actions, not necessarily concerted, of many public bodies and by their interplay with the actions of other parties in an ongoing market structuring process.

Shapiro's conceptual framework and initial empirical findings are set forth in his Program working paper, *Hypoth-*

FIGURE 3. **The Faculty Seminars — 1974/75.**

From the birth of an idea to the critical review of project findings, the Program's Faculty Seminars play a key role in planning and carrying out the Program's work and in conveying its results to varied publics.

● indicates presentations related to planning for the study of international and domestic information policy described on page 12.

September 30
THE CONVERGENCE OF WHAT IS AND WHAT SHOULD BE — Raymond A. Bauer, Professor of Business Administration, Harvard Business School.

October 7
THE CYBERNETIC THEORY OF DECISION — John D. Steinbruner, Associate Professor of Public Policy and Assistant Director of Program for Science and International Affairs.

October 15
JOURNALISM AND SCHOLARSHIP: TWO APPROACHES TO FACT-FINDING AND THEIR EFFECTS ON PUBLIC POLICY — Peter Cowan, *Boston Globe* Spotlight Team and Valerie Nelson & George Nolfi, University Consultants, Inc.

October 21
THE DATA PROCESSING INDUSTRY: THE HISTORY OF ITS GROWTH AND SOME PREDICTIONS FOR THE FUTURE — Montgomery Phister, Jr., Visiting Lecturer.

October 29
THE COMPUTER/COMMUNICATIONS BORDER — Kurt Borchardt, Program Consultant and Theodore Merrill, Staff, *Business Week*.

November 4
THE CURRENT STATE AND PROSPECTS OF THE EDP INDUSTRY — James Peacock, Editor, *EDP Industry Report*.

November 11
COMPUTER NETWORKING — Thomas C. Bartee, Professor of the Practice of Computer Engineering.

December 10
"COMPUTERS AND PRIVACY" ISSUE — Alan F. Westin, Professor of Public Law and Government, Columbia University.

● **February 10**
THEY "LOVE LUCY" AND READ *TIME* EVERYWHERE — William Read, Research Fellow in Center for International Affairs.

eses on the Interactions of Public Policy with Other Factors in the Structuring of an Information /'Communications ¦ Market: The Case of the Specialized Communications Market.

The text, charts and maps of the main introductory chapter of Shapiro's paper characterize the services in the specialized communications market, the public's stake in the market and the parties involved in the structuring process. The bulk of the work details the interactions of public policy with each of the other factors in turn. In each case, major questions about the interactions are set forth, and hypotheses are developed about what strategies (including randomness) the various parties might be following. Empirical data, primarily from public records, supporting each hypothesis are also given.

These hypotheses give preliminary clues as to the nature of the goals of the various parties in the struggle over specialized carriage. They also suggest the effectiveness of each party in advancing its goals and set out the public stakes favored or disfavored by the existing market structuring process. (For complementary findings in the cable television field, see the discussion of Anne Branscomb's work on page 7).

The implications of Shapiro's findings are developed further in the work by Paul Berman and Tony Oettinger described on page 12 , in the study of performance and politics described on page 12 , as well as in the study next described.

Shapiro, a political science graduate of the University of British Columbia, holds a Ph.D. in communications research from Stanford. He was one of the earliest Program participants. In July 1974, he joined the staff of Arthur D. Little, Inc., an affiliated corporation, and he remains a research fellow in the Program.

FIGURE 3.
continued

● February 24
SOME TRENDS IN COMPUTER COMMUNICATION ARCHITECTURE — Paul E. Green, Program Director, Communications, IBM Corporation.

● February 28
THE FUTURE ROLE AND ORGANIZATION OF TELECOMMUNICATIONS — I. A. Newstead, Senior Assistant Director-General, National Telecommunications Planning Branch of the Australian Post Office.

● March 3
PERFORMANCE TRAITS OF COMPUTER/COMMUNICATION SYSTEMS — Kurt Borchardt, Program Consultant and Hendrik Bode, Gordon McKay Professor of Systems Engineering, Emeritus.

● March 10
TELECOMMUNICATIONS IN DEVELOPING COUNTRIES — THE TRIPARTITE INVOLVEMENT OF THE UNITED STATES — Alan B. Kamman, Section Manager, Telecommunications Sciences, Arthur D. Little, Inc.

● March 17
INTERNATIONAL TRADE ASPECTS OF TELECOMMUNICATIONS — Paul Polishuk, Acting Deputy Director, Office of Telecommunications, U.S. Department of Commerce.

● April 14
Continuation of March 10 seminar. . . .

● April 28
THE INTERNATIONAL TELECOMMUNICATIONS UNION — A CHANGING ORGANIZATION — Robert E. Lee, Commissioner, Federal Communications Commission.

● May 12
THE EVOLVING STRUCTURE OF THE COMMUNICATIONS NETWORK — Eugene V. Rostow, Sterling Professor of Law and Public Affairs, Yale Law School.

May 19
THE FREEDOM ON INFORMATION ACT AND PRIVACY — COMPATIBLE OR CONFLICTING? — Donald E. Stitzenberg, Executive Director, Clinical Biostatistics and Research Data Systems, Merck Sharp & Dohme Research Laboratories.

10

Elements of Information Resources Policy: Library and Other Information Services

The nation has many information resources. The challenge is how best to marshal these to meet the needs of the people. The choice between private and public instruments is not crucial. What matters is how funds flow and who benefits from them, how unique information resources are best exploited and how the conflicting ideals of equal opportunity and of local or private decision-making are accommodated.

Costs in this field have risen more rapidly than elsewhere. At issue is whether growth in services should and can be sustained and how costs might be controlled. Accounting and pricing practices are poor, however, and better support for management and policy decisions is essential. The equity of subsidy and cross-subsidy practices, long at issue in postal and telephone services, is of growing importance in the realm of library and other information services.

Anthony Oettinger examined this area under a Program contract with the National Commission on Libraries and Information Science. The resulting report, first issued in February 1975, looks at relationships among information providers and their clients in order to mark the economic, institutional and technological factors that are key in deciding how people get the information they need. It focuses particularly on the private sector information industry and the library world.

A considerable amount of data is assembled, including 78 figures. The findings point to issues that are complex and persistent, although their manifestations often change rapidly.

Oettinger concludes that the public has benefited unevenly from both private and public information services. Planning for such services has generally failed to take into account the full spectrum of demands and constraints that affect the outcome of any plans.

Oettinger is the Director of the Program.

Harvard Center for International Affairs: Transnational Seminars — 1974/75.

FIGURE 4.

This cooperative venture of the Program and the Center for International Affairs was instrumental in planning for the study of international and domestic information policy described on page 12.

● most germane presentations.

● **October 3**
REALITIES OF INTERNATIONAL TELECOMMUNICATIONS — Robert J. Angliss, Executive Vice President, RCA Global Communications.

October 10
MERCANTILISM REVIVED — Stephen Krasner, Assistant Professor of Government, Harvard University.

October 17
PUBLIC DIPLOMACY FROM COLD WAR TO DETENTE — Patrick Nieburg, Deputy Assistant Director, U.S. Information Agency.

October 24
COMECON AND THE POLITICS OF SOVIET/AMERICAN TRADE; GREAT EXPECTATIONS — Connie Friesen and Dan Yergin, Research Fellows, Center for International Affairs.

● **October 31**
SCIENCE AND TELECOM POLICY — Clay T. Whitehead, Institute of Politics, Harvard University, and Center for International Studies, Massachusetts Institute of Technology.

November 7
THE BALANCE OF POWER BETWEEN HOME COUNTRIES, HOST COUNTRIES AND INVESTORS Theodore Moran, Research Associate, Brookings Institute.

● **November 14**
IDEAS AND INFORMATION COMMUNICATIONS IN WORLD AFFAIRS — John Richardson, Assistant Secretary of State for Educational and Cultural Affairs, U.S. Department of State.

COSTS AND PRICES OF INFORMATION SERVICES

Increasingly, the Program is focusing on the processes whereby information services are defined, their costs determined, and their prices set. These processes are far richer in political subtlety than is suggested by analyzing them only from the viewpoint of market mechanisms or of formal regulatory proceedings.

Questions about the relationship between costs and prices are only now beginning to enter explicitly onto the library scene described above. They have long occupied center stage in the realms of telephone and postal services.

United States Postal Service Rate Structure: Who Plays, Who Pays

Gordon Imrie is examining the Postal Service's rate-making procedures, both for their intrinsic interest and for the light they shed on the procedures followed in other information systems. He is drawing extensively on help from the Postal Service and its constituencies.

His report, addressed mainly to relating facts, is expected to be available in the fall of 1975. This report will include a capsule chronology of landmark rate and subsidy decisions, and a sketch of the development of postal accounting practices. The bulk of the report will describe the dynamics of rate-setting processes, with principal attention to describing the interests and relative strength of the various interested parties. These include the users, affected by rates and rate-setting processes for different classes of mail, and other players such as the postal unions, the telecommunications services, suppliers of postal equipment, and actual or potential competitors such as electronic funds transfer systems and the United Parcel Service.

Imrie, a second-year student at the Business School, is a graduate of Stanford University, where he studied political science and communication.

FIGURE 4.
continued

November 21
AMERICAN MULTINATIONALS AND EUROPE — Richard Gilmore, Staff Consultant, Senate Foreign Relations Subcommittee on Multinational Corporations.

December 5
THE UNCHANGING HOST COUNTRY — MNC BALANCE OF POWER IN SMALL DEVELOPING COUNTRIES: THE CASE OF TRINIDAD AND TOBAGO — Andrew Richter, Graduate Student Associate, Center for International Affairs.

● **December 12**
FREEDOM FROM THE FREE FLOW — Herbert Schiller, Professor of Communications, University of California, San Diego.

December 19
CENTRAL BANK COOPERATION AND INTERNATIONAL MONETARY REFORM: FLEXIBLE EXCHANGE RATES — Michael Brenner, Research Fellow, Center for International Affairs.

● **February 6**
AMERICA'S MASS MEDIA MERCANTILISTS — William Read, Research Fellow, Center for International Affairs.

February 13
TRANSNATIONALISM AND POLITICAL UNITY: THE CASE OF EUROPE IN THE ENERGY CRISIS — Robert J. Lieber, Research Fellow, Center for International Affairs.

● **February 20**
WORLD POLITICS AND INTERNATIONAL NEWS MEDIA — Sig Mickelson, Professor, Medill School of Journalism, Northwestern University.

February 27
POWER AND ECONOMIC TRANSACTIONS — Susan Strange, Professor, Royal Institute of International Affairs.

Cross-Subsidies in the Telephone Industry

Money made by public utilities in high-profit areas is often used to subsidize service in low-profit areas. Elizabeth Lazarus tested the workings of theory and reality in the provision of rural telephone service.

In gathering her research materials, Lazarus paid particular attention to the allocations of costs and benefits in the pricing and availability of telephone service across areas of varying population and traffic densities. Her work laid a foundation for the more extensive study by Berman and Oettinger described next.

Lazarus took her bachelor's degree in history in June 1975 and is now with the CBS Morning News in Washington, D.C.

The Medium and The Telephone: The Politics of Information Resources

Once, there were only telephones, but today the telecommunications network ties telephones to teleprinters to computers to newspaper files to entire television stations. Telecommunications and computer technologies and services grow less and less distinct, but the network itself has become an infrastructure essential to most functions of modern society, including many that reach right into the home.

The traditional cost/price relationships of the telecommunications industry are therefore undergoing upheavals unparalleled since the industry was born in the 19th century. And as the function of telecommunications has penetrated every aspect of the 20th century, these cost and price struggles can profoundly affect not only elements of individual daily life, but also all our major social systems.

In the fall of 1974, Paul Berman and Tony Oettinger, drawing on earlier Program work, set out to explain the political, economic and technological factors underlying these challenges and their likely effects on cost/price relationships, aiming at five thousand words and a few figures, comprehensible to an educated general audience. Twenty thousand words and forty one figures later, their draft, *The Medium and the Telephone: The Politics of Information Resources*, entered the Program's reviewing process in the summer of 1975. The manuscript, in working paper form, is expected to be issued in the fall of 1975.

Since tracing the effects of changing cost/price relations on all the functions served by the telecommunications network is impossible, Berman and Oettinger chose the gathering and spreading of the news as their main example. They review the history of these relations as they developed, in relatively quieter times, through the interplay of numerous actors, including regulators in the Federal Government and all fifty states. By analyzing contemporary battles over rates and rate-setting procedures, the sources of these conflicts, and the new actors involved, they trace how changes arising in one area of telecommunications supply or demand can send major waves across all others.

By coherently synthesizing much of the Program's prior work, this paper is expected to serve as a staging for further research, as well as the basis for the layman's article originally envisaged.

Local Distribution of Information

The term "global village" is often used to describe the effects that the telephone, broadcasting, cable television, and microwave relays have had on world communications, but all these are means of communication in real villages as well, along with the mailman, the newsboy, the milk company, United Parcel Service, door-to-door salesmen, and other local conveyers of goods and services and information.

Wallace Wormley is planning a study of the political, economic and technological forces that determine what local information functions are served by what means.

Wormley, a psychology graduate of Howard University with a mathematics minor, received his Ph.D. from Harvard and has extensive experience as a financial analyst in the securities field. He will hold a joint appointment between the Program and the Business School, where he will be Research Fellow in Business Administration, working with Professor Jay W. Lorsch of the Organizational Behavior faculty.

PERFORMANCE AND POLITICS: INTERNATIONAL INFORMATION RESOURCES POLICY

In July 1975, William Read, an officer of the U.S. Foreign Service, began preparing an atlas mapping the development of the international flow of computer data via telecommunications systems.

This was the beginning of a major Program study of the performance capabilities of information systems and of the political, economic, and technological factors that affect the international availability and utility of those systems.

Planning for this project has been in itself a major project, as noted at the end of this section and in Figures 3 and 4. The aim is the ingathering and analysis of basic information on the technology and politics of international communications on both the operating and policy levels.

Although the Program has undertaken only limited international studies in the past, we found many of our research projects pointing unmistakably across the borders of the United States. We also noted a strong family resemblance among international and domestic information policy issues. The project plan draws together many of the threads first spun in the other research projects described in this Annual Report, and applies the Program's style and methods to its established policy concerns.

The Program's initial explorations of the subject will have two carefully limited objectives:

- First, to characterize the present set of international information institutions in terms of their powers, policies, and practices, and their likely influence on information resources policy. Institutions of interest will be selected among corporations within countries; national legislative, regulatory and operating agencies; international agencies; multinational corporations and other transnational organizations such as professional and trade associations; and both suppliers and users of communication/computer/information equipment and services.

- Second, to develop characterizations of the significant performance capabilities of communication/computer/information systems. Such characterizations should describe the significance of the capability to users, designers, policy makers, etc.; be amenable to use as a means of measurement; help in evaluating benefits and costs; lend themselves to analyses of tradeoffs among capabilities; and permit exploration of processes whereby specific tradeoff options can be selected.

Insofar as possible, performance capabilities will be compared across national and organizational boundaries to discern relations, if any, between performance and organization.

Read's task begins to address the first of these objectives. He will be preparing analytical reports for government policy makers and others already struggling with the political and economic issues in this area. His atlas will map not only the development of cross-border data flows, but also the conditions and interests which influence that development.

Planning has been completed for pursuit of the second limited objective, the development of international performance measures for the information technologies, and the Program is now seeking funding for this work.

Underlying the project plan are the following assumptions:

O The continuing worldwide spread of electronic technology will continue to be plagued with interrelated technical, political, and economic problems which will continue to get worse;

O The international information arena is unusually susceptible to tension and conflict because the American mode of communication through private capitalist enterprises seeking markets is at such variance with the communications mode of the rest of the world with its consensus-minded government monopolies;

O The U.S. government and public are insufficiently sensitive to the positive and negative potentials in this field. The only government officials involved have been busy fire-fighting, trouble-shooting, and problem-solving while the strategic echelons have remained uninvolved;

O Studies on the middle-term, two to ten years ahead, are vitally needed to pass the news that information policy need not be made by *fait accompli*;

O Significant decision-makers in this field include not only governments and intergovernmental agencies, but the general public, as well as the users, investors, suppliers, installers, and operators of information systems;

Reaching Varied Publics — The Life of a Study. **FIGURE 5.**

Program findings are communicated to varied publics by a continuing process using the means most appropriate to the subject matter and the stage of development of the work. The work illustrated here is described on page 20.

COMPUTERS OR COMMUNICATIONS? ALLOCATION OF FUNCTIONS AND THE ROLE OF THE FCC

May 1973	**Idea presented to Faculty Seminar.**
September 1973	**Working Paper issued.**
November 1973	**Announcement in TELECOMMUNICATIONS REPORTS, 200 requests filled.**
January 1974	**Seminar at Office of Telecommunications of Department of Commerce, IBM, etc.**
May 1974	**Program publication issued; distributed through National Technical Information Service and submitted to journals.**
Fall 1974	**Publication in FEDERAL COMMUNICATIONS BAR JOURNAL.**
April 1975	**Abridged version reprinted in COMPUTER LAW SERVICE.**
July 1975	**Principal background paper for Computer-Communications Interface workshop at the Federal Communications Commission's first Future Planning Conference.**

O The domestic aspects of the field, reflected in the work of the Program to date, are intimately involved and intertwined with its international aspects.

In the course of planning for this project, the Program has begun surveying people at both the operating and policy levels among users of international information services including airlines, banks, auto makers, electronics, food processors, hotels, pharmaceutical manufacturers, news and publishing organizations (both print and electronic), the oil industry, retailers, and shippers; communications, computer, and information suppliers; and the concerned national and international agencies.

Among the problems perceived by *policy-level* people are actual or potential conflicts over:

O international cooperation vs. international competition (e.g., the use of standards, copyrights, etc. as bargaining counters);

O control of movement, processing or storage of information;

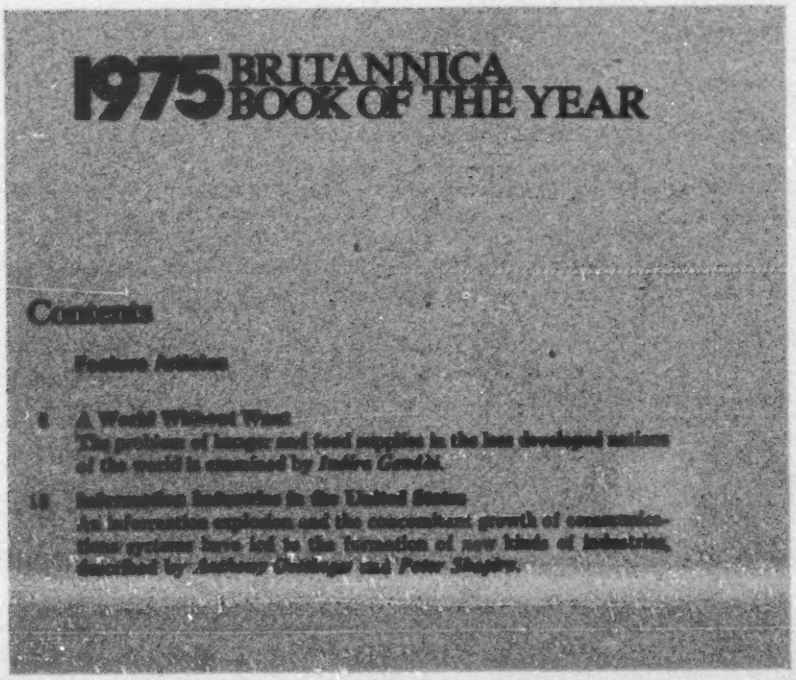
O a U.S. tendency toward treating computers and communications as separate sectors and converse tendencies abroad;

O a U.S. tendency to favor domestic competition over domestic monopoly in the international operating sphere and converse predilections abroad; postal, telephone and telegraph organizations with governmental ties abroad, multiple private enterprises in U.S.; diverse research and development practices; diverse accounting practices; differing policies as to direct subsidies or cross-subsidies and as to vertical integration.

O the diverse institutional frameworks of diverse technologies (e.g., cable and satellite) or services (e.g., data *transmission* and data *processing*);

O the relationships between national policies toward foreign users and suppliers of computer/communication/information goods and services and toward

FIGURE 6. **Reaching Varied Publics — Through Diverse Publications.**



domestic development and usage, as these policies affect capital formation, industrial development and productivity, education and other key factors.

Problems of immediate concern to *operating* people include:

O multiplicity of signaling protocols, data formats and other system incompatibilities;

O data integrity and security;

O discrimination (rates, legal rights, etc.) on access;

O accounting practices;

O increasingly artificial divisions between voice and record (data) carriers;

O multiple levels of jurisdiction and their relationship to complex rate structures;

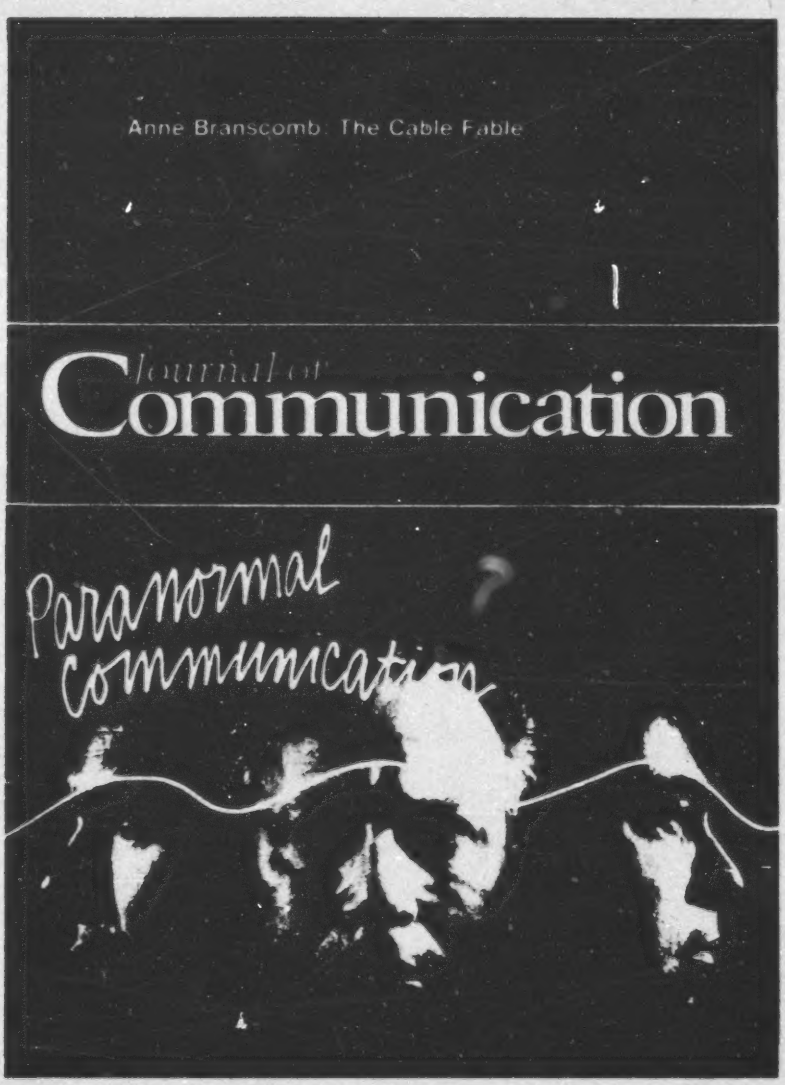
O price and performance consequences of differing patterns of responsibility for end-to-end services, alternative locations of gateway cities in international telecommunications, etc.

The Final Aims of the Project

It is not merely the accommodations on these issues, but also the nature of the processes of accommodation, which determine the performance of America's communication/computer/information systems—and the world's. This research project aims to isolate and describe these processes, and to list the principal choices that may be available among alternate processes. Where possible, the tradeoffs among the outcomes of various processes will be described.

The project therefore aims to develop realistic appraisals of: the likely performance capabilities of the alternative systems that would evolve in response to present or alternative policies and decision processes; technological, political, and other realities and uncertainties that affect performance; the choices among alternative policies and systems; and

FIGURE 6 *continued*



the likely effects of and tradeoffs among these choices.

This appraisal is to be conducted in terms of performance capabilities described not only by conventional technical and economic measures but also by such concepts as accessibility, separability, fair-shareability, simplicity (convenience), responsiveness, safety, security, reliability, connectibility, substitutability, resource conservation, flexibility and growth potential. It is to be as free as possible from predispositions toward any particular policy instruments and decision processes. It will be conducted on both operating level and policy level terms, and with emphasis on the middle term.

The scope of appraisal is illustrated by the following questions:

O What are present performance capabilities and expectations? How well are they matched? Through what processes?

O Are expectations reflected in market demand? Are they needs expressed by or attributed to individuals or groups? Are they realistic, based on poor information, or daydreams?

O What are present directions and rates of change in performance and expectations? How are these matched to tomorrow's performance expectations?

O Who is in the arena? With that resources? Who perceives what impediments to meeting which expectations?

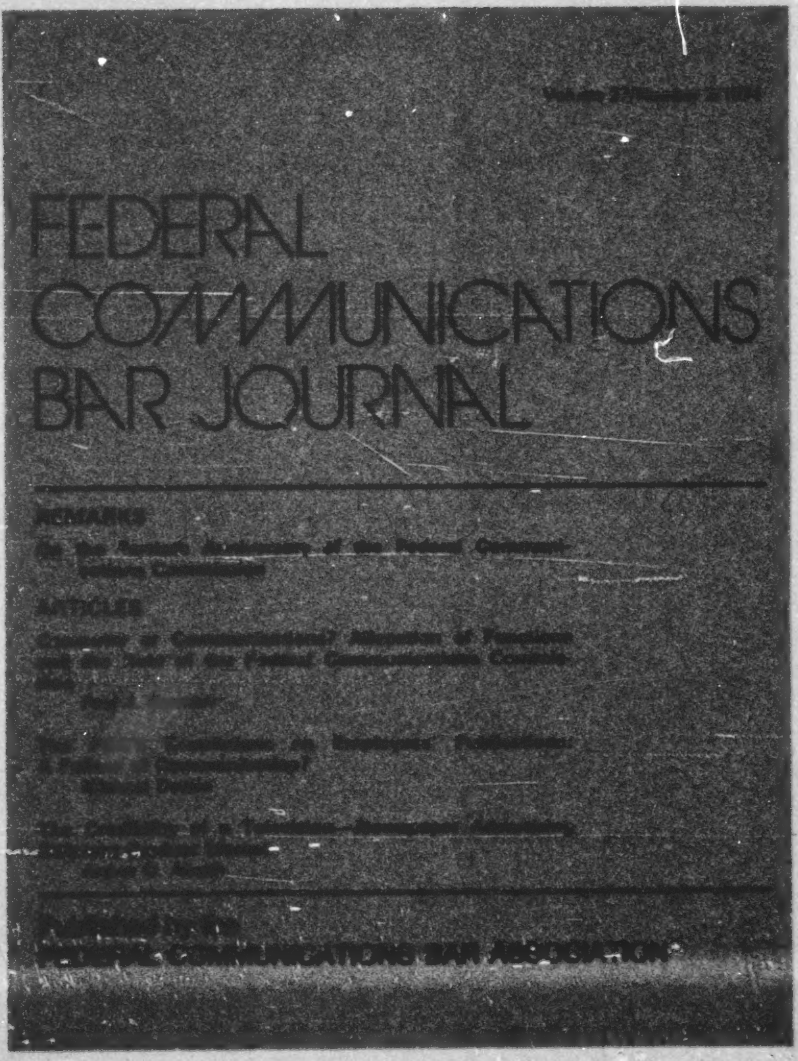
O What can be done about the perceived problems nationally, internationally? What options may be exercised? Through what processes?

O With what likely consequences for whom?

Planning for this international project began at the Program in the winter of 1973-74. Most of the Program's studies up to that time had concentrated on the United States, but it was already clear that the "information problem" stopped

FIGURE 6.
continued

Reaching Varied Publics — Through Diverse Publications.



at no nation's borders. As the Program pursued its international interest, others were found engaged in the same pursuit and cooperative planning began.

After more than a year of working toward a beginning, the planners included not only the Program and a number of its researchers, but also the Harvard Center for International Affairs, the First National City Bank of New York, Mobil Oil Corporation, Pan American World Airways, Standard Oil of Indiana, as well as many of the Program's own affiliated organizations.

William Read's task, the opening of the larger project, is conducted by the Program in conjunction with the White House Office of Telecommunications Policy. The Policy Planning Staff of the U.S. Department of State is also interested in the product of his work.

INDIVIDUALS, INSTITUTIONS AND INFORMATION TECHNOLOGIES

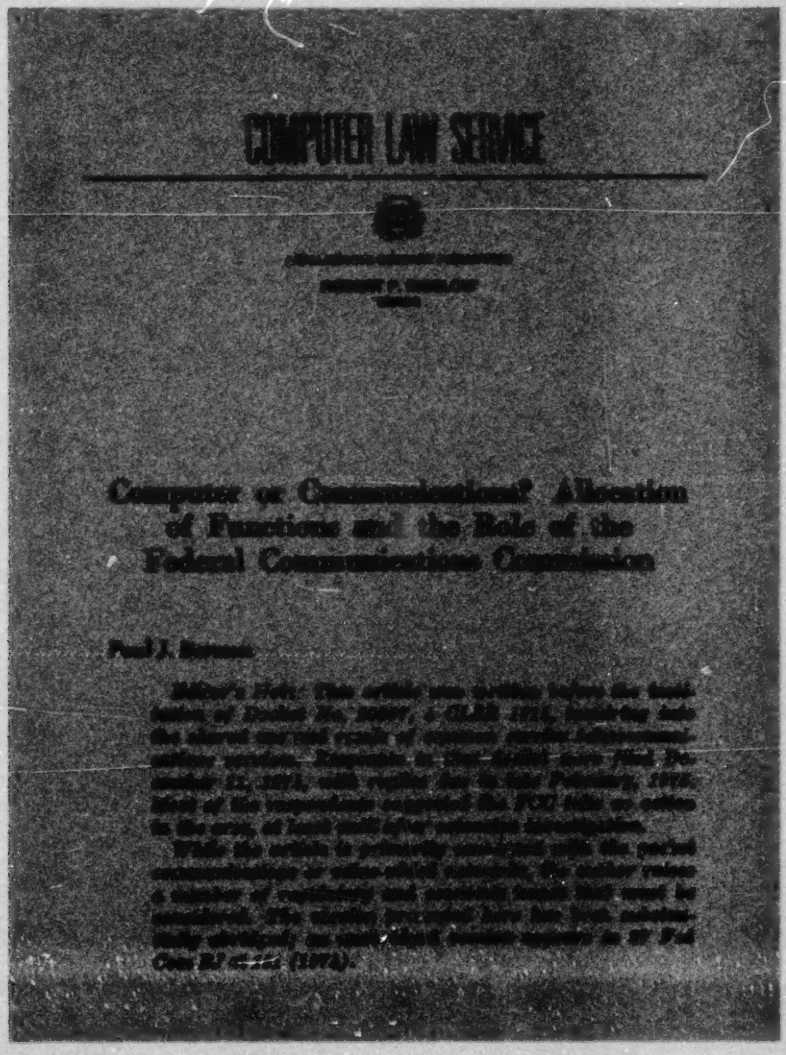
New patterns of flow and control of information in and between organizations mean new patterns of power, and vice versa. The very suppliers and users of information are altered by the ways in which they supply and use information. The following research projects seek to illuminate the relationships in this cycle among individuals, organizations and information technologies.

Public Policy and Personal Information

David Seipp has prepared a status report and bibliography on the regulation of information systems that handle personal data. Centering on the Freedom of Information Act as amended in 1974 and the Privacy Act of 1974, the report also encompasses the Fair Credit Reporting Act of 1970, the Bank Secrecy Act of 1970, the "Buckley Amendment" to the Family Educational Rights and Privacy Act of 1974, other relevant Federal statutes and state laws regulating the collection and use of personal information.

Seipp's report outlines the legislative history of the statutes and the posi-

FIGURE 6.
continued


COMPUTER LAW SERVICE

Computer or Communications? Allocation of Functions and the Role of the Federal Communications Commission

tions of individuals and organizations supporting or opposing regulation in these areas. Drawing on the many previous case studies, surveys, hearings, and recommendations on privacy and disclosure, Seipp supplements the report with a selective annotated bibliography of approximately 1000 items.

The report is addressed to the interests of owners, users, and subjects of personal information systems that are or may soon be under government regulation in such issues as:

- the conflict between privacy, the individual's "right to be let alone", and disclosure, the public's "right to know";
- the balance of privacy rights with a free press, public health, consumer safety and effective law enforcement;
- the balance of full disclosure with property rights in information, national security, and the privacy of decision-makers and their informants;
- the costs, benefits, and unforeseen dislocations resulting from the extension of privacy and disclosure regulations from government information systems to those in the private sector.

David Seipp is an undergraduate in Harvard College majoring in history.

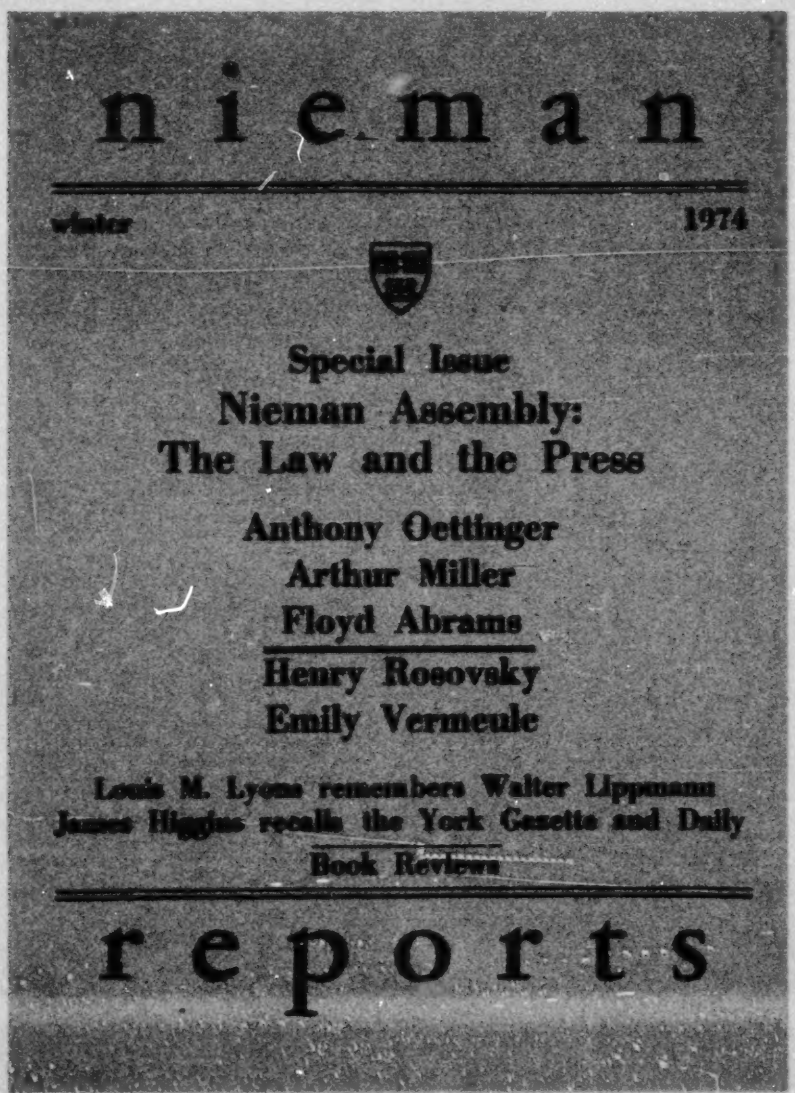
The Cost of Privacy

Robert C. Goldstein has explored the operational and financial implications of databank-privacy regulation. His book, *The Cost of Privacy*, was published early in 1975 by Honeywell Information Systems, Inc.

Goldstein acknowledges the rapid growth of personal data systems and the drive toward regulating them, pointing out, however, that regulation will entail additional costs that may impede the operation of the systems or the attainment of regulatory goals. He devises and illustrates practical techniques for assessing the costs of different types of

FIGURE 6. *continued*

Reaching Varied Publics — Through Diverse Publications.



regulation and for projecting their implications.

The book grew out of Goldstein's doctoral work at the Harvard Business School, which was directed by Professor Richard L. Nolan, with cooperation by the Program. Goldstein is now Assistant Professor of Commerce and Business Administration at the University of British Columbia in Vancouver.

Broadcasting and Telecommunications Systems in Developing Countries — Whom Do They Benefit?

Developing countries are investing heavily in modern communications systems. Broadcasting systems are expected to facilitate national integration and speed up education. Telecommunications improvements are widely regarded as necessary to the development of the infrastructure needed for modern industrialization. For the period 1972-1976 alone, the World Bank has committed $610 million for telecommunications development in 22 countries.

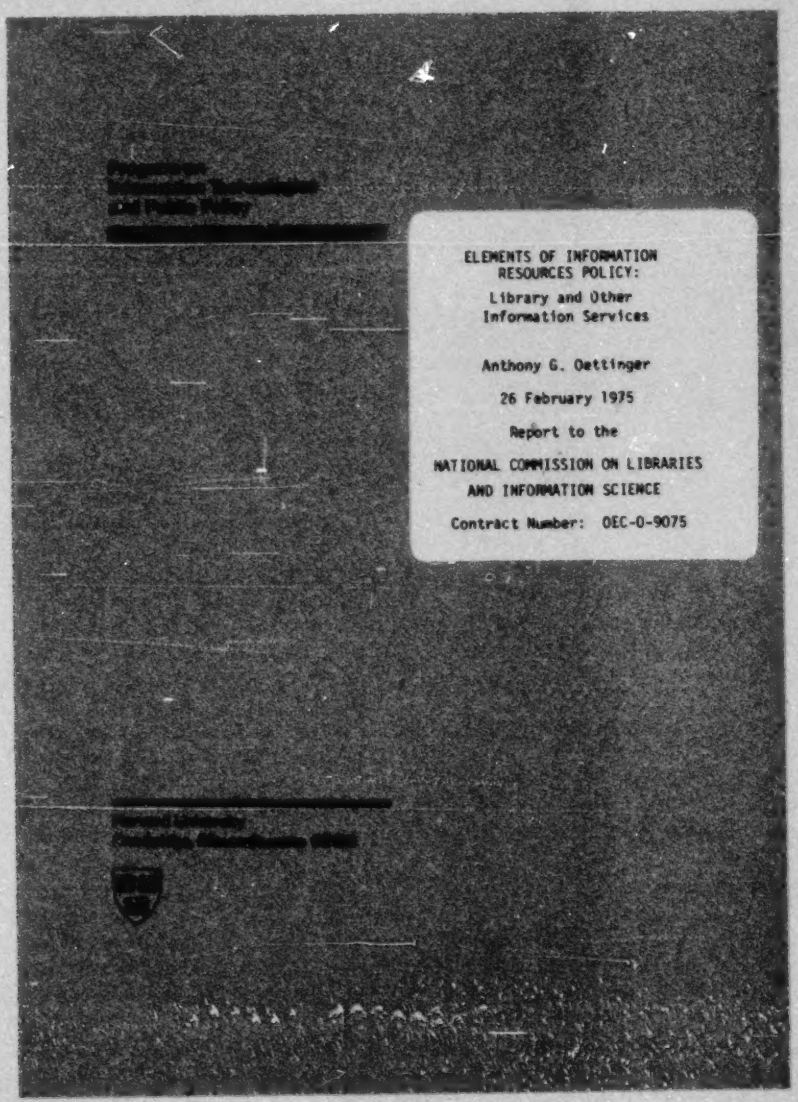
John Clippinger is planning a study of the social, economic and political effects of the introduction of these systems into developing countries. The study will focus on the uses of these technologies to determine the direct beneficiaries of their introduction. Not every such new system will be studied, but a survey of communications developments of a number of countries will be combined with studies of a few countries in depth.

Clippinger is proceeding with exploratory studies of El Salvador's educational television project and of Algeria's telephone system to sharpen the definition of the full study.

Clippinger, a research fellow with the Program, holds a Ph.D. degree in communication from the Annenberg School of Communication at the University of Pennsylvania and a B.A. in anthropology from Yale University.

Reaching Varied Publics — Through Contracted Reports.

FIGURE 7.


ELEMENTS OF INFORMATION RESOURCES POLICY:
Library and Other Information Services
Anthony G. Oettinger
26 February 1975
Report to the
NATIONAL COMMISSION ON LIBRARIES AND INFORMATION SCIENCE
Contract Number: OEC-0-9075

What's Wrong with Management Information Systems?

Management information systems (MIS) are designed on the untested assumption that people will change their behavior greatly to assure consistency and reliability in their organization's information system. Chris Argyris plans to test this assumption.

Argyris suspects that systems designed to maximize reliability and consistency in fact encourage inconsistency and unreliability in those who are supposed to work with them. Such systems tend to create requirements that people find noxious and which they will resist overtly or covertly, he believes. Such tendencies are evident in public concerns about privacy and freedom of information emanating from the clients of organizations, but less public attention has been given to the effects of information systems on people within organizations.

Two major hypotheses will be tested in this research. The first concentrates on current MIS design practices and reactions to them. The second focuses on design improvements that might take these reactions into account. First: Current MIS design practices encourage both overdependence and, at the same time, antagonism; people react to this ambiguity by altering information inputs and otherwise misusing the systems; this reduces both the current effectiveness of the systems and their long-term acceptance and utility. Second: Randomness, inaccuracies, and misrepresentations in conventional systems serve social functions which must be accounted for if future MIS designs are to be more effective than present ones.

Argyris is James Bryant Conant Professor of Education and Professor of Organizational Behavior at the Schools of Education and Business respectively and a member of the Program's Executive Committee. Informal planning of this project began in December 1973 and has involved Argyris and the Program staff as well as John Griffith of IBM, an affiliated corporation, and John W. Weil, then of Honeywell.

Video Telephone

Peter Shapiro and Tony Oettinger have written a critique of *The Video Telephone — A New Era in Telecommunications — A Preliminary Technology Assessment* (Praeger, New York, 1974), a book by Edward M. Dickson and Raymond Bowers of Cornell's Program on Science, Technology and Society. The critique — with rejoinder and rebuttal — appears in the Autumn 1974 issue of the *Journal of Communication*.

Dickson and Bowers describe the technology of the video telephone and competing two-way visual communications systems and attempt to anticipate the broad consequences of a change from voice to video in the nation's telecommunications systems and also examine the consequences in such realms as medical care and education. Oettinger and Shapiro endorse the technological content of the book, but detect some omissions, and criticize the value of this "technology assessment" as a scholarly approach to helping policy makers.

The Program originally undertook this brief study at the request of the authors for collegial criticism. A subsequent request by the National Science Foundation's RANN (Research Applied to National Needs) program for a confidential evaluation of the book prompted a decision to seek open publication, in the belief that the published results of policy research at universities are best reviewed in open forum.

Transportation, Communications and Headquarters Location

Warren Lavey has broken new ground in using Dun's Market Identifiers, an extensive Dun & Bradstreet computer data base, to measure *empirically* how much considerations of transportation and communications influence decisions on where to locate corporate headquarters in manufacturing firms with a number of plants. His findings confirm the notion that physical closeness to the largest plant within a firm and to the headquarters of other firms is a highly significant factor in selecting a headquarters site. Lavey's paper *Transportation/Communications Considerations in the Location of Headquarters for Multi-Establishment Manufacturing Firms* is undergoing final review and revision prior to submission for publication.

How much physical closeness can be traded for closeness achieved through telecommunications is still a matter for investigation. Evidence presented at the May 13, 1974 Faculty Seminar by Robert Auray, Director of Business Research for AT&T Long Lines, an affiliated corporation, suggests that travel and telecommunications grow together and not at the expense of one another.

Lavey's work on this subject grew out of discussions in the graduate seminar, Public Policy 283b, *Information Technologies and Public Policy*, (see page 24), in the spring of 1974. Under the supervision of Professors Robert A. Leone and John R. Meyer of the Business School, it continued in the summer of 1974 at the National Bureau of Economic Research, of which Meyer is president.

REGULATION OF INFORMATION SYSTEMS

The information industries cover many different patterns of free and regulated markets, and of private and public information enterprises. The studies described in this section emphasize the regulatory processes and skirmishes at the borders between regulated and free markets. They consider such questions as: What distinguishes communication services from data processing services and what difference does that make to whom? How are decisions made locally? Nationally? By whom?

The FCC at the Computer/Communications Border

The technologies of computers and communications have grown more and more alike over the years, but the regulatory mechanisms of the Federal Communications Commission were designed for the technological formats of the telegraph, telephone and broadcasting industries of 1934 and they have not changed. As a result, the FCC has had some difficulties in dealing with the advent of new computer/communications technologies. In his study, *Computers or Communications? Allocation of Functions and the Role of the FCC*, which was completed in May 1974, Paul Berman studied in considerable detail the Commission's attempts to catch up with technology. As chronicled in Figure 5, Berman's findings continue to be of lively interest.

In 1971, the FCC confirmed a previously tentative decision, known generically as the Computer Rules, which showed where the FCC felt the boundary should be drawn between computers and telecommunications, or, more precisely, between regulated and unregulated data processing. Warfare at this border continues to flare up. In the summer of 1974, for example, IBM expressed its intent to acquire a communications satellite subsidiary. The public has a considerable social and economic stake in which services of this sort are regulated and which are not.

In his research, Berman compares three services. They are directory assistance, automatic location of callers through the "911" emergency number, and packet-switched computer-to-computer communications. Drawing on these examples, he develops the legal and technological factors supporting or undercutting the FCC and those who seek an unregulated market, the options available to policy-makers, and the consequences likely to flow from exercising any option.

Berman's conclusion is that "the decision to employ the FCC's allocation mechanism need not have been made by the Commission, and indeed may not have been an appropriate decision for it to make", and that in all likelihood the decision will have to be made again by other policy-makers, including Congress and the courts.

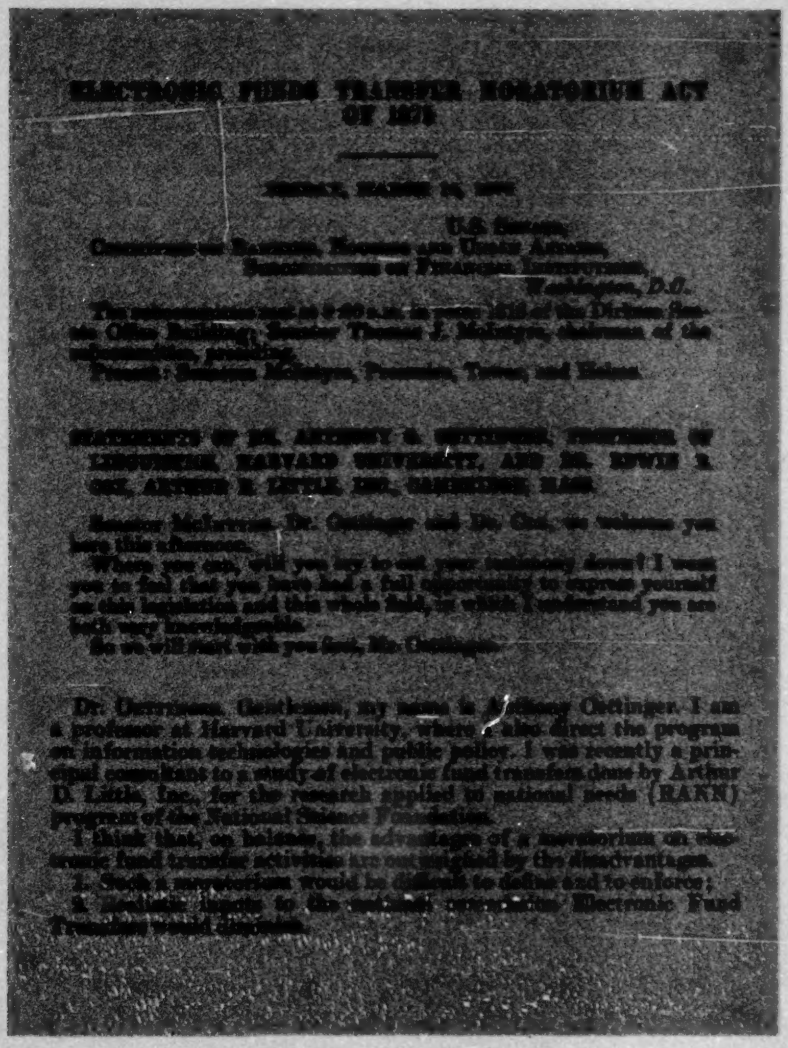
Berman, who has been with the Program since its inception, is a graduate of Harvard College in computer science and of Harvard Law School. He left in August 1975 to join the law firm of Covington and Burling in Washington, D.C., but he is continuing Program research in this area.

CATV Leased Access Channels and the Federal Communications Commission: The Intractable Jurisdictional Question

In 1973, Paul Berman began studying jurisdictional issues in CATV at the request of the Massachusetts Community Antenna Television Commission. He continued the work in 1974-75 under the joint guidance of Donald Trautman, Professor of Law at the Harvard Law School, and the Program.

His paper, *CATV Leased Access Channels and the Federal Communications Commission: The Intractable Jurisdictional Question,* traces the history of

Reaching Varied Publics — Through Congressional Testimony. **FIGURE 8.**



ELECTRONIC FUNDS TRANSFER MORATORIUM ACT OF 1975

Dr. Ostinger. Gentlemen, my name is Anthony Ostinger. I am a professor at Harvard University, where I also direct the program on information technologies and public policy. I was recently a principal consultant to a study of electronic fund transfers done by Arthur D. Little, Inc. for the research applied to national needs (RANN) program of the National Science Foundation.

I think that, on balance, the advantages of a moratorium on electronic fund transfer activities are outweighed by the disadvantages.

1. Such a moratorium would be difficult to define and to enforce;

2. Serious hurdle to the successful operation Electronic Fund Transfers would increase.

FCC assertions of jurisdiction over CATV systems and facilities, developing the hypothesis that the jurisdictional question is as elusive today as it was fifteen years ago when the FCC and the courts first addressed it. He notes that, in all significant attributes, leased-access channels serve the function of communications common carriage, and proposes that their regulation be considered explicitly in that light. FCC assertions of jurisdiction over these channels are compared to similar assertions over communications common carriage. Examination of the issues raised by this comparison leads to the conclusion that Congressional action on the jurisdictional issue is necessary.

The paper is scheduled to appear in December 1975 in the *Notre Dame Lawyer*, Volume 51, No. 2.

State Regulation of Cable Television

Cable television is a political issue in each of the 50 states. Eleven have enacted formal regulations on cable TV and 13 others have such regulation under active consideration. The others have left regulation to the federal government and local communities while waiting for the dust to settle or some pattern to emerge on the state level.

Connecticut, Massachusetts, Minnesota, New Jersey, and New York, among others, already have state regulation. California, Illinois, Michigan, Pennsylvania, Texas, and Wisconsin are some who are actively considering legislation. **Morton H. Aronson** and **Kas Kalba** plan a study of both regulated and unregulated states.

The issues involved are of several kinds, including:

O Public policy. Should states become involved at all, since federal and local governments have preceded them? Will further regulation be redundant with a deleterious economic impact, or is it vitally necessary to consumer protection despite any drawbacks?

O Legal and organizational issues. Should a state's public utilities commission assume the cable regulatory role, as in Connecticut, Nevada, and elsewhere, or should an independent body be established, as in Massachusetts, Minnesota, and New York? Should regulatory bodies do more than regulate? Should they perform state telecommunications planning, advise localities on cable, operate demonstration projects?

O Specific regulatory issues. Should states set rates? In what manner? To what degree do they or should they preempt or complement local regulators?

O Impact issues. Does state regulation help or hinder cable growth? Does it alter the relationship of localities to local system operators? How does it affect consumers? Does it lower costs? Improve service quality? How does it affect the cable industry?

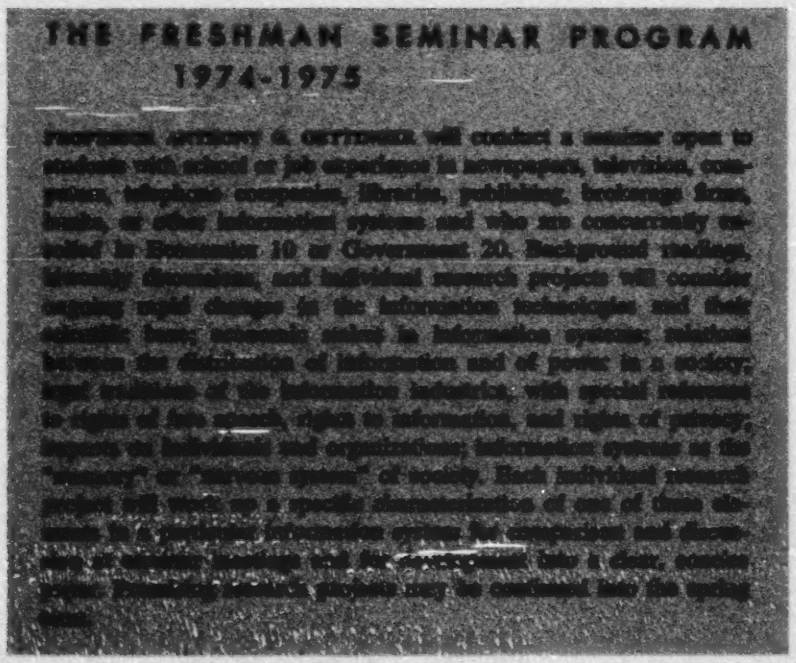
Aronson and Kalba plan to compare the outcomes of legislative decisions and regulatory practices of the eleven existing state cable agencies with outcomes in other states without regulation. Different forms of regulation will also be compared. The result will be a book analyzing the legal options and policy implications of different possible courses of state cable action.

Aronson was the first chairman of the Massachusetts Community Antenna Television Commission. He is an attorney with the Boston firm of Grabill and Ley. Kalba is a Lecturer in City Planning at the School of Design and President of Kalba Bowen Associates. He has been with the Program since its inception. He chaired a planning committee that developed the Program's original directions.

Local Regulation of Cable Television

Cable television is regulated not only by the FCC and some states, but also by local governments. Prescriptive literature

FIGURE 9. **Reaching Varied Publics — Through Teaching.**



on what the behavior of local regulators should be is abundant, but much less has been written about what their behavior has turned out to be.

In his Program working paper, *City Meets the Cable: A Case Study of Cincinnati's Decision Process*, **Kas Kalba** addresses this problem. Kalba describes the national context in which Cincinnati's decision to postpone wiring the city for CATV took place, and identifies the interests and the efforts of public officials, franchising applicants, CATV experts, community groups, and members of the general public who participated in these deliberations. The paper was the result of extensive use of printed national and local information as well as more than forty interviews with public and private participants in the process. The paper concludes with an assessment of the process and of the lessons to be learned from it.

Kalba gathered considerable further data on local regulation in 1974-75. The Program plans to publish a new report, *City Meets The Cable: A Case Study in Technological Innovation and Community Decision-Making*, in September 1975. Much of this information will also be used in Kalba's doctoral dissertation in City Planning at the University of Pennsylvania.

Communications Satellite Policy

Roger Kvam, a doctoral candidate in political science, is working on a thesis titled *Ideology and Policy: A Study in the Development of the Communications Satellite Corporation, 1963-1973*. Kvam's background research to date has included studies of the antitrust, anti-bigness ideology, the effects of this ideology on the COMSAT legislation, the struggles, compromises and questions that led to the creation of COMSAT, and the further struggles, compromises and questions that followed the creation of COMSAT.

Kvam was referred to the Program early in 1974 by Don Price, Dean of the Kennedy School of Government. William M. Capron, of the Program's Executive Committee, and Tony Oettinger both participate in overseeing Kvam's thesiswork.

BACKGROUND INFORMATION STUDIES

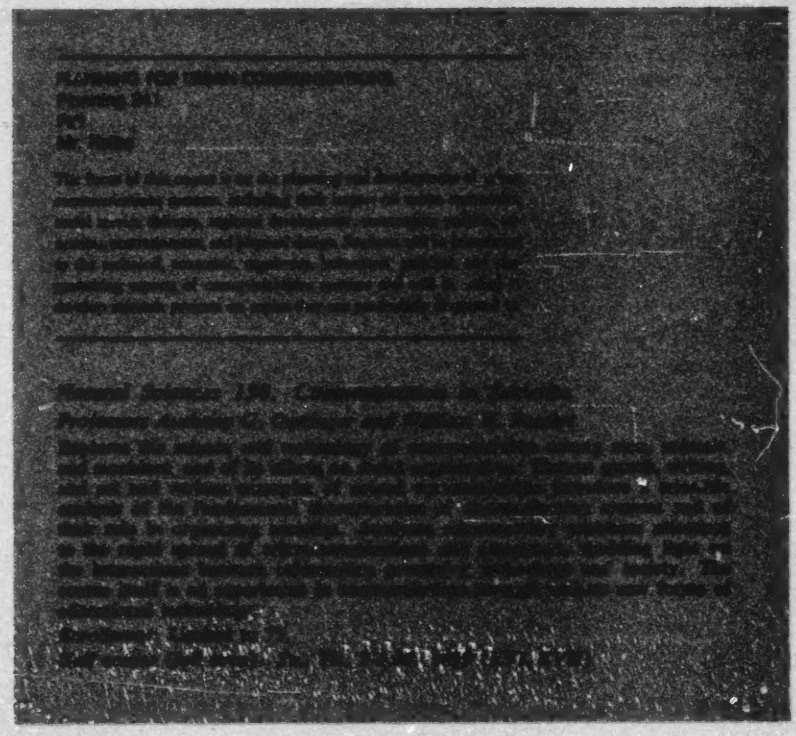
The setting of information resources policy is not unrelated to general questions of policy setting. Some of the Program's work overlaps into this broader area.

The Process of Legislative Compromises

The making of legislative and other public policy compromises is little understood. To outside observers, some legislative compromises seem to endanger cherished principles, while others seem purely cosmetic to attract a few additional votes. Public policy compromises relying partly on competition and partly on regulation often are faulted by those who prefer exclusive reliance on one or the other. Kurt Borchardt, retired legal counsel to the Committee on Interstate and Foreign Commerce of the U.S. House of Representatives, and a consultant to the Program, has written *Legislative Compromise Techniques*.

In his paper, Borchardt argues that compromise is an essential element of legislation, except in those rare instances where polarized positions command overwhelming public support. His argument is supported with extensive examples from his own Congressional staff experience. Borchardt notes that regardless of the subject being legislated, interactions among three factors determine the chances of passage. They are the individual "style" of the legislators who play

FIGURE 9.
continued



leadership roles regarding the legislation under consideration, the institutional setting, and the subjective assessments these legislators make of the issues. He concentrates on this last point, arguing that in order to enhance chances of passage, legislators seek to avoid sharp, polarized issues and search for subtly shaded information on the issues which will tend to reduce their "voltage".

Issues in appropriation legislation, he argues, are naturally low voltage because the information pertaining to such issues has already been explored in authorizing legislation and because quantities of money can readily be increased or decreased. Everyone already knows what the Agriculture Department is authorized to do, and the decision involves merely whether it should do more or less.

Sometimes it is possible to lower the voltage of issues through imaginative use of legislative skills. While the issue of *federal aid* to schools of public health was sharply divisive when introduced in Congress in 1946, a bill *reimbursing* the schools for expenses incurred in connection with Federal training programs of public health personnel passed easily.

Controversial policy objectives frequently are attainable by resorting to elaborate forms of administrative arrangements designed to achieve wanted objectives by indirection, and the paper cites numerous examples.

Making Complex Decisions

Standard analyses of political decision-making attempt to explain or guide policy in terms of a more or less explicit calculus whereby all possible options are tested for their contribution toward maximizing explicit goals. Individuals and organizations involved are viewed as "rational actors" working within an "analytical paradigm". In his book, *The Cybernetic Theory of Decision: New Dimensions of Political Analysis* (Princeton University Press, 1974), John D. Steinbruner argues for more reality and less abstruse rationality.

Steinbruner focuses on the irremediable *complexity* of most decision-making situations and on the failure of prevalent political theories to account adequately for decisions made in complexity. Some variants on standard theories take into some account the dispersal of decision-making power concealed by the image of the monolithic actor — "Moscow's policy is..."; "the White House wants . . ." — as well as the multiplicity and flux of values represented in any decision. Steinbruner distinctively carries this awareness of complexity to another stage by taking into account the imperfect correspondence between the information on hand and reality. Drawing from concepts developed by cognitive psychologists, logicians, and computer scientists, Steinbruner develops an alternative theory of decisions and tests it on various examples, particularly on the decisions about the sharing of nuclear weapons through a multilateral force (MLF).

To assist Steinbruner in the further development of his theories, and to draw on them for its own purposes, the Program established a discussion group in the fall of 1974 including Steinbruner along with Hendrik Bode and John Griffith, both long affiliated with the Program's research; Oliver Selfridge, Senior Research Associate at MIT; Edward O. Wilson, Professor of Zoology; and members of the Program staff. Vincent Mosco's thesis on broadcasting policy (discussed below) drew significantly on Steinbruner's theories and provided additional tests of their merit and utility.

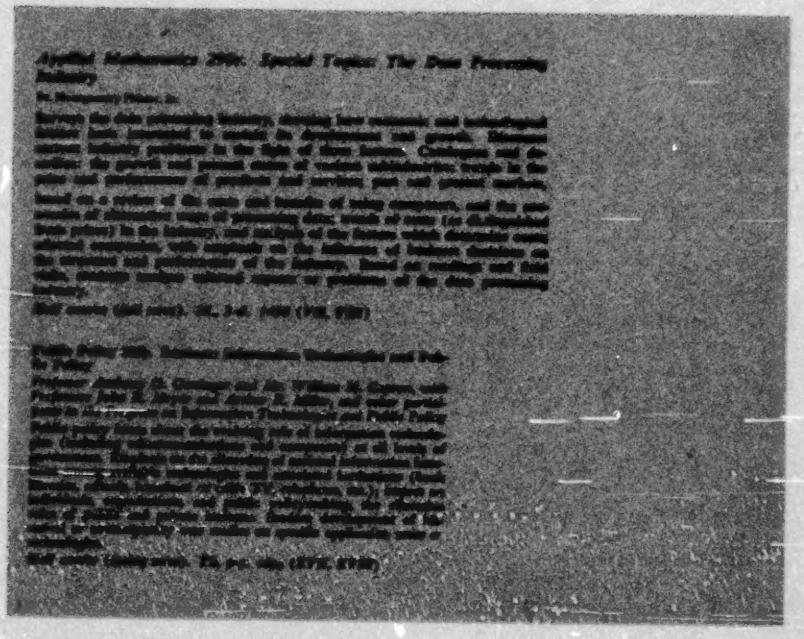
Steinbruner is Associate Professor of Public Policy and Assistant Director of the Program for Science and International Affairs.

Absorption of Broadcasting Innovations

Vincent Mosco, a doctoral candidate in sociology, has written his thesis on how the FCC has dealt with such broadcasting innovations as FM radio, UHF television, cable television (CATV), and pay-TV. He drew heavily on previous Program research as well as other case studies from

Reaching Varied Publics — Through Teaching.

FIGURE 9. *continued*



recent years. He also employed the theoretical approach of John Steinbruner (discussed above).

One hypothesis Mosco tests is that, in each case, the outcome of policy-setting was the placing of each innovation into a role ancillary to the form of broadcasting dominant at the time the innovation was introduced. He further believes that "The most useful way to compare the policy-making processes that led to such outcomes as the evidence supports is to consider them as responses to structural complexity that do not conform to traditional notions about rational decision-making."

Mosco's comparisons afford an opportunity to compare the explanatory power of Steinbruner's theories against that of standard theories. The soundness of both prevalent criticisms of FCC procedures and proposed remedies could be significantly challenged and recommendations for more effective alternatives proposed if, indeed, Steinbruner's theories are supported by the evidence in these cases.

During the summer of 1975, Mosco worked with the Program to develop a paper based on his thesis, but oriented toward policy makers.

Mosco had his attention called to the Program in the fall of 1973 by Daniel Bell, Professor of Sociology, who supervised Mosco's work along with Christopher S. Jencks, Professor of Sociology, and Tony Oettinger.

He received his Ph.D. in sociology in June 1975 and joined the faculty of Lowell University as Chairman of the Department of Sociology. He will continue as a research fellow with the Program.

Determinants of FCC Decisions

Richard Berner has completed a study of the forces which shape the FCC's cable regulatory process. After analyzing salient decisions in the history of cable regulation, Berner focuses on the most recent cable rules. He analyzes in detail the industry groups' "consensus agreement" which successfully altered the Commission's choice of cable regulations. He suggests that, as a result of the process fostered by this "agreement", "extra-agency groups were able to determine FCC outcomes by so structuring the Commission's options that their choice became that which . . . best served the combined interests of these extra-agency groups".

Berner then proceeds to analyze the process by which the Commission implements its cable rules. He notes that here intra-agency forces seem to shape FCC decisions. Citing James Q. Wilson's observation "If the agencies have been captured by anyone it is probably their staffs", Berner analyses the role of the Cable Television Bureau in the rule enforcement process. Contrary to traditional views of administrative behavior, Berner maintains that the Cable bureau has a direction and purpose distinguishable from the Commission as a whole. Using several case examples to demonstrate his argument, he shows how by using its control over information and other delegated responsibilities, the Cable Bureau is able to influence the rule enforcement process.

Berner's interest in the cable situation began in the spring of 1973 while he was working in the office of then FCC Commissioner Nicholas Johnson. His first paper on the subject was prepared for the Program that summer. His research became his senior thesis, *Constraints on the Regulatory Process: A Case Study of Regulation of Cable Television*, which was rated summa cum laude upon his graduation in June 1974 by a committee comprising William M. Capron, lecturer on Political Economy and Associate Dean of the Kennedy School of Government; Dan H. Fenn, lecturer on Business Administration and Director of the Kennedy Library; and Irene Taviss Thomson, then lecturer on Sociology.

The thesis has been revised under Program guidance and issued as a Program paper and also submitted for publication. Berner has entered Columbia University's Law School.

The Economics of Technology

Technology is frequently blamed as the source of many social problems, or attacked for the failure to ameliorate them. In an essay aimed at illuminating such discussions, issued as a Program working paper, Montgomery Phister, Jr., argues that in general the problems arise because of changes in the production, distribution, and consumption of technology's goods and services. He calls these matters the substance of the economics of technology, and proposes that faculties of engineering and science should add courses in and devote research to this complex and fascinating subject. He describes a prototype study and a university course on a portion of the general subject: the economics of data-processing technology.

Peter D. Shapiro, Research Fellow in Information Technologies and Public Policy, and Anthony G. Oettinger have prepared a 5000-word feature article, *Understanding Information Industries in America*, that appeared in the *1975 Britannica Book Of The Year*.

The article gives the lay reader a broad view of the role information industries play in our society and of their impact on public policy.

The information industries are large, and growing more rapidly than the Gross National Product. They are becoming increasingly intertwined, and often technologically indistinguishable. The public has a considerable stake in certain information issues. Two of these, privacy and access to information, and public control over media content are described and other issues are listed.

3

SPREADING THE WORD 1974/75

These are the Program's efforts to make its findings known to those who participate or have a stake in the setting of policy.

The Faculty Seminar

The Faculty Seminar was one of the Program's first activities, beginning in September 1972 and continuing to the present. Despite its title, participation in, attendance or presentation is not limited to faculty members. Selected undergraduates and graduate students take part, as well as a substantial number of participants from outside the academic community and outside the Boston-Cambridge area.

The discussion topics for the 1974-75 seminars are given in Figure 3. Earlier seminar topics are listed in the Appendix.

They include not only reports on Program research, planned, underway, or completed, but also discussions of technological or policy developments in our universe of discourse.

Discussions have been informal and lively. Frank admissions of incomprehension and fitting translations of terms and other explanations are encouraged and forthcoming.

Tape recordings and informal notes are available from all the Faculty Seminars. In some cases, more formal reports or working papers are also available. See the listing of papers available from the Program on page 29.

Mailing Lists

The Program maintains a mailing list of approximately 325 names (and steadily growing). It includes, among others, key government personnel, corporations active in the Program's area, academics and private experts. These persons receive notices of and invitations to all seminars and colloquia, notices of new work in progress and of new reports, and the annual reports. Three hundred more individuals receive the annual reports.

Publications and Presentations

During the year, Program participants made various presentations, and several of their publications appeared in journals.

Publications:

Branscomb, Anne W., "The Cable Fable: Will It Come True?," *Journal of Communication*, Winter, 1974-75.

Kalba, Kas, "The Space-Shrinking Impact of Communications Technology on the Quality of Life: A Commentary," in Clair K. Blong, ed., *Proceedings of the Conference on Systems Thinking and the Quality of Life*, Society for the General Systems Research, Washington, D.C., 1975.

_____, "Deregulation, Franchising, or Public Planning: An Evaluation of Cable Development Models," in Mary Louise Hollowell, ed., *Cable Handbook, 1975-76: A Guide to Cable and New Communications Technologies*, Washington, D.C., Communications Press, 1975.

_____, "The Electronic Community: A New Environment for Television Viewers and Critics," in Douglass Cater and Richard Adler, eds., *Television as a Social Force*, New York, Praeger, 1975.

Kalba, Kas, "The Wired Future of Urban Communication," in Gerhard J. Hanneman and William J. McEwen, eds., *Communication and Behavior* Reading, Mass., Addison-Wesley, 1975.

_____, "Urban Telecommunications: A New Planning Context," *Overseas Telecommunications Journal* (Japan), Research Institute of Telecommunications and Economics, Tokyo, No. 9, 1974.

_____, "Chartering the Electronic City: New Directions in Urban Cable Policy," *Broadcasting Management/Engineering*, September, 1974; also in *Urban Telecommunications Forum*, December, 1974.

Meyer, John R., "The U.S. Railroad Industry in the Post-World War II Period: A Profile" (with A. L. Morton), in *Explorations of Economic Research*, Vol. II, No. 3, Summer, 1975.

_____, "A Better Way to Run the Railroads" (with A. L. Morton), *Harvard Business Review*, July-August 1974.

Oettinger, Anthony G. and Shapiro, Peter D., "Information Industries in the United States," *1975 Britannica Book of the Year*, Encyclopaedia Britannica, Inc., Chicago, Illinois, 1975.

_____, "Merging Media and the First Amendment," *Nieman Report*, Winter, 1974.

_____, and Shapiro, Peter D., "A Dialogue on Technology Assessment: The Video Telephone," *Journal of Communication*, Autumn 1974, Vol. 24:4.

Wormley, Wallace P., "The 1975 Economic Environment for CATV," *Cablelines*, January 1975.

Lectures and Presentations:

Kas Kalba

May 25-29, 1975
"Considerations in National Communications Planning," Conference on the Role of New Communications Systems, International Broadcast Institute (in association with the Canadian Broadcasting Corporation and the Department of Communications), Ottawa.

April 16-18, 1975
"Linking Policy Research to Regulatory Decisionmaking," Conference on Telecommunications Policy Research, Airlie House, Airlie, Virginia.

Anthony G. Oettinger

July 14-15, 1975
with Paul J. Berman, led the Computer-Communications Interface Workshop at the FCC's First Planning conference in Washington, D.C.

April 16-18, 1975
Panelist and discussant at 1975 Conference on Telecommunications Policy Research, Airlie, Virginia.

March 14, 1975
Testimony on Electronic Fund Transfers before the Committee on Banking, Housing and Urban Affairs, U.S. Senate, Washington, D.C.

February 27, 1975
Access to Information Resources: The Policy Issues presented at Syracuse University's Colloquium on Information Studies, Syracuse, New York.

January 30, 1975
participated in the American Association for the Advancement of Science session on "Telecommunications and Democracy," New York.

January 14, 1975
Burdens and Benefits of Library and Other Information Services: Public versus Private Sector, presented at the Analytic Methods Seminar, Kennedy School of Government, Harvard University.

October 24, 1974
Merging Media and the First Amendment, presented to the Nieman Assembly, Harvard University.

October 22, 1974
Faculty Seminar on Information Resources at Philips Academy, Andover, Massachusetts.

October 16, 1974
Information Utilities from the Public's Standpoint presented at the annual meeting of the American Society for Information Science, Atlanta, Georgia.

Several Program publications are available from the National Technical Information Service. Discussions are underway with the Educational Resources Information Center (ERIC) and the American Society for Information Science as additional distributors.

4

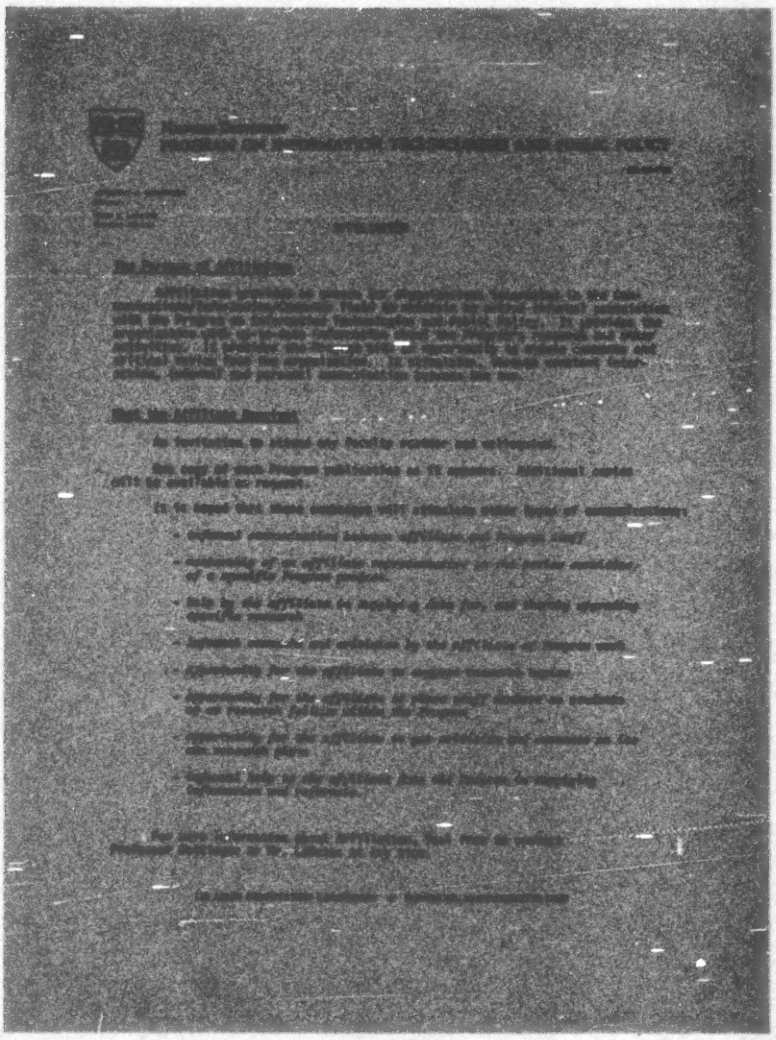
TEACHING 1974-75

Undergraduates in Harvard College and graduate students in the Schools of Arts and Sciences, Business, Government and Law continue to request advice and guidance from Program participants. Some students have sought guidance on particular projects, others are interested in including information technology and public policy into their study plans. Among these, Paul Berman, Richard Berner, Paul DiMaggio, Gordon Imrie, Roger Kvam, Warren Lavey, Elizabeth Lazarus, Vincent Mosco, Daniel Prives, David Seipp and Wallace Wormley, are participating in Program research (Section 2).

Student interest in the Program coincides with a general rise of interest in the area of science, technology and public policy as reflected by increasing numbers of students seeking degrees in special concentrations in the area. A consulting committee for the Committee on Degrees in Special Concentrations was created in June 1974 to advise these students. The Committee, chaired by Harvey Brooks, Dean of Engineering and Applied Physics, includes James N. Butler, Professor of Applied Chemistry; William M. Capron; I. Bernard Cohen, Professor of the History of Science; Robert Dorfman, Professor of Political Economy and Anthony G. Oettinger. To aid in advising students, the Program maintains a listing of related courses throughout the Univer-

Reaching Varied Publics — The Affiliation Process.

FIGURE 10.



sity and refers students to faculty members who can help them with independent study in specialized areas.

Five courses (Figure 9) are closely associated with the Program in both subject matter and participating faculty. Freshman seminars are one way in which Harvard College gives undergraduates an early opportunity to get first-hand research experience and to establish closer relations with faculty than is possible in the larger lecture courses making up the bulk of undergraduate fare. One graduate seminar is part of the offerings of the Public Policy program of the Kennedy School of Government; the other is given in the Department of City and Regional Planning of the School of Design.

The course on the data processing industry was a one-time offering of the Program in conjunction with the Center for Research in Computing Technology of the Division of Engineering and Applied Physics. It was taught by Montgomery Phister, Jr., who visited Harvard during the 1974 fall semester. Phister, with twenty years of experience in computer technology ranging from a Ph.D. under Maurice Wilkes at Cambridge University in 1953 to his most recent position as Vice President and Manager of the Computer Development Division, Xerox Data Systems, is completing a book on the subject of the course.

Communication in Societies was an experimental course in substance, format and technique. As such, it has outlived its usefulness and will no longer be offered. A new course, based on experience and knowledge generated by the Program, will be created by Oettinger during 1975-76 and be offered in 1976-77. The University has given Oettinger sabbatical leave for the fall term of 1975, thereby relieving him of teaching obligations while planning the new course and continuing to direct the Program.

The cross-fertilization between research and teaching activities is evident from the overlap between Program participants and faculty responsible for these courses. In addition, Carol Weinhaus has assisted in *Communication in Societies*, most notably by taking charge of the video facilities and by supervising students' video experiments. Paul Berman and Daniel Prives became interested in research in the Program's field as students in the course and later, along with Nikki Zapol, served as Teaching Assistants or Fellows. Elizabeth Lazarus and David Seipp are the most recent course participants to join in Program research.

APPENDIX

The Faculty Seminars — 1973/74

October 4
Who does What at the Computer/Communications Border: Allocation of Functions and the Role of the FCC: Paul Berman, Harvard Law School, '75.

October 11
Satellite Technology and Economic Market and Policy Factors: Richard B. Marsten, Director, Communications Program, Office of Applications, NASA.

November 1
Planning by Regulation: William S. Comanor, Visiting Professor, Department of Economics.

November 8
Value of "Statistical Overview of the Information/Communication Industries": What is to be Gained from a Study with No Analysis and No Conclusions?: Warren G. Lavey, Harvard College, '74.

December 13
A First Generation Economic and Demographic Model of Organizational Communication Systems: Anthony S. Niskanen, Staff Member, Arthur D. Little, Inc.

January 14
One Aspect of Public Policy Formation: Devising Compromise Proposals in Public Policy Conflicts: Kurt Borchardt, formerly Legal Counsel to the Committee on Interstate and Foreign Commerce, U.S. House of Representatives.

January 21
Reorganizing Knowledge Systems to Improve Policy-Making: Manfred Kochen, Professor in Information Science and Urban/Regional Planning, University of Michigan.

February 4
The Teleprompter Syndrome and Its Aftermath: Can Cable Fulfill Its Promise? Anne W. Branscomb, Esq., formerly Communications Counsel for the TelePrompTer Corporation.

February 19
How the Law Treats Information: Harry Bloom, Director, Legal Research Center for Communications and Computers, University of Kent at Canterbury.

February 25
Optical Transmission Technologies: Progress and Problems to Date: R. Victor Jones, Professor of Applied Physics, Division of Engineering and Applied Physics.

March 4
Control of Learning: Do New Information Technologies and New Institutions Make a Difference? Nikki Zapol, Staff Member, Program on Information Technologies and Public Policy.

March 11
Analysis of Demand for Video Communications: Jeff Rohlfs, Bell Laboratories.

March 18
City Meets the Cable: A Case Study of Cincinnati's Decision Process: Konrad K. Kalba, Instructor in City Planning, Graduate School of Design.

March 25
Europe's Computer Industry: Closer to the Brink: Robert Hayes, Professor of Business Administration, Business School.

April 8
Information from the Public for Decisions Affecting the Public: Stephen A. Greyser, Professor of Business Administration, Business School, and Executive Director, Marketing Science Institute.

April 15
Whither Newspapers? Whither Newspapers?: Vincent E. Giuliano, Staff Member, Arthur D. Little, Inc.

April 22
The Coming of Post-Industrial Society: Daniel Bell, Professor of Sociology, Faculty of Arts and Sciences.

April 29
The Changing Research Library: Douglas W. Bryant, Director, Harvard University Library, Professor of Bibliography.

May 6
How the Meaning of Information is Changing: Samuel Lubell, Fellow, Institute of Politics.

May 13
Relationship Between Travel and Telecommunications: Robert R. Auray, Director, Business Research, AT&T Long Lines.

May 20
The Potential Impact of the Communications Revolution on Health Care Delivery: Maxine L. Rockoff, Health Scientist Administrator, Bureau of Health Services Research, Department of Health, Education and Welfare.

May 28
Many Career Schools Turn Education into a Fast Buck: Gerald M. O'Neill, Head, Boston Globe Spotlight Team.

June 3
Tax Law and Computer Technology — The Impact on Industry Participants and Governments: Roy N. Freed, Esq., Peabody, Brown, Rowley & Storey.

The Faculty Seminars — 1972/73

October 19
The ARPA Network: Thomas Cheatham, Gordon McKay Professor of Computer Science, Center for Research in Computing Technology.

November 2
Transportation and Telecommunications: Paul Cherington, James J. Hill Professor of Transportation, Business School.

November 16
The Importance of Information in Economics: Michael Spence, Assistant Professor of Political Economy, School of Government.

December 14
Information Technologies and Copyright: Stephen Breyer, Professor of Law, Law School.

January 8
FCC Regulatory Policies at the Interfaces: Hyman Goldin, Professor of Communications, Boston University; Member, Massachusetts CATV Commission; Former Chief, Economics Division, FCC.

January 22
The Impact of Information Technologies on Organizations: Chris Argyris, James Bryant Conant Professor of Education and Organizational Behavior, School of Education and Business School.

January 29
Information Markets and the Value of Information: Daniel Prives, '73 Harvard College.

February 5
Transportation Policy at the Interfaces: Paul Cherington, James J. Hill Professor of Transportation, Business School.

February 15
Urban Cable Communications: Defining a Planning Process: Konrad K. Kalba, Instructor in City Planning, Graduate School of Design.

February 22
New Information Technology and Health Care Delivery Policy and Institutional Alternatives for the Development of CATV: William Capron, Lecturer on Political Economy and Associate Dean, School of Government.

March 1
Aids to the Delivery of Ambulatory Medical Care: Barney Reiffen, Principal Associate in Medicine, Medical School, and Assistant to the Dean, School of Public Health.

March 8
Assimilation of Communication Technology in the United States and Other Advanced Countries: James L. McKenney, Professor of Business Administration, Business School.

March 15
Analysis of Dynamic Structuring of the Communications Industry: Processes of Allocation of Functions to Competing Enterprises: Peter Shapiro, Research Fellow in Information Technologies and Public Policy.

April 12
Exploring Constitutive Rationality: Case Studies in Information Technologies: Laurence H. Tribe, Professor of Law, Law School.

PAPERS AVAILABLE FROM THE PROGRAM ON INFORMATION TECHNOLOGIES AND PUBLIC POLICY AS OF September 1975

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Elements of Information Resources Policy: Library and Other Information Services
Anthony G. Oettinger
Final Report Forthcoming

Examines the relationships among information providers and their clients. The economic, institutional, and technological factors which determine how people get the information they need are addressed. 78 charts and tables. (Report to the National Commission on Libraries and Information Science.)

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City Meets The Cable: A Case Study in Technological Innovation and Community Decision-Making
Kas Kalba
September 1975

An amplification of the March 1974 case study on the cable TV decision process in Cincinnati. Compares the Cincinnati results with decision-making in other large cities and evaluates several prescriptive approaches to cable development ("deregulation," franchising guide books, and public planning proposals) in the light of how decisions are actually made at the municipal level. Examines the nature and limitations of municipal control over technological innovations and assesses cable development options in the context of federal and state regulatory policies.

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The Regulation of Broadcasting in the United States: A Comparative Analysis
Vincent Mosco
August 1975

A report on commonalities in FCC decision-making on four innovations in the broadcasting market (FM, UHF, CATV, STV). These commonalities help explain similar outcomes in each of these cases, namely treatment of each innovation as ancillary to the dominant commercial broadcasting system. In turn, these commonalities may be understood by considering the FCC as an organization responding to a complex environment with simplifying behavior that does not conform to traditional notions about analytical decision-making.

_____ copies at $10.00: $_____

Constraints on the Regulatory Process: A Case Study of Regulation of Cable Television
Richard Berner
August 1975

What forces shape the FCC's cable regulatory process? The paper presents a detailed analysis of the industry groups' "consensus agreement," which successfully altered the Commission's choice of cable regulations, and of the Cable Bureau's role in enforcing these regulations with directions and purposes distinguishable from those of the Commission as a whole.

_____ copies at $6.50: $_____

CATV Leased Access Channels and The Federal Communications Commission: The Intractable Jurisdictional Question
Paul J. Berman
June 1975

This paper traces the history of FCC assertions of jurisdiction over CATV systems and facilities, developing the hypothesis that the jurisdictional question is as elusive today as it was fifteen years ago when the FCC and the courts first addressed it, and that Congressional resolution of the question is therefore necessary.

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Information Industries in the United States
Anthony G. Oettinger and Peter D. Shapiro
May 1975

Describes the "information explosion" and the concomitant growth of communications systems leading to the formation of new kinds of industries. Reprinted from the *1975 Britannica Book of the Year*. Copyright, Encyclopaedia Britannica, Inc., Chicago, Illinois.

_____ copies at $1.00: $_____

Information Technologies and Control Over Learning
Paul DiMaggio and Nikki Zapol
April 1975

Outline of project for analyzing the patterns of control over information flow to learners via traditional textbooks, broadcast video and computer assistance to determine—and, if possible, to explain—differences and similarities and their likely impact on individuals and on society.

_____ copies at $2.00: $_____

The Cable Fable: Will It Come True?
Anne W. Branscomb
April 1975

Science fiction claims and "blue sky" promises oversold an industry and tied it up in red tape. A realistic assessment finds its future a matter of public concern. Reprinted by permission of the *Journal of Communication*.

_____ copies at $1.00: $_____

Bibliographic Tools
Carol Weinhaus, editor
April 1975

Vol. 1: A guide to reference books, monographs, journals and other literature. Vol. 2: Legislative Guide — guide to legislation, executive orders, regulatory decisions, etc.

_____ copies at $5.50: $_____

The Economics of Technology
Montgomery Phister, Jr.
January 1975

Discusses importance of the production, distribution, and consumption of high-technology goods and services, and how these might be better examined at universities.

_____ copies at $1.00: $_____

Shared Systems versus Stand-Alone Systems
Montgomery Phister, Jr.
January 1975

Examines the functional and cost performance of shared versus stand-alone computer systems. The application areas for which each is most suitable are explored.

_____ copies at $1.00: $_____

A Dialogue on Technology Assessment: The Video Telephone — Critique and Rejoinder
Anthony G. Oettinger and Peter D. Shapiro
January 1975

A critical review of facts, assumptions and speculations found in Dickson and Bowers' assessment of the video telephone. Reprinted by permission of the *Journal of Communication*.

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Merging Media and the First Amendment
Anthony G. Oettinger
Winter 1974

The lightly edited transcript of an address to the Nieman Assembly, a gathering of newspaper and television executives convened by the Nieman Foundation at Harvard University. Reprinted by permission of *Nieman Reports*.

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Computer or Communications? Allocation of Functions and the Role of the Federal Communications Commission
Paul J. Berman
Fall 1974

Interaction between new offerings combining computer and communication technologies and old legal doctrines leads to evaluation of the scope of the concept of communications common carriage with resulting impact on the jurisdiction of FCC and policy options available to deal with these new offerings. This paper has appeared in the *Federal Communications Bar Journal*, Vol. 27, No. 2, 1974, pp. 161-230 and is also available through the National Technical Information Service, #PB-235146/AS.

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A Perspective on Information Resources, Scope of the Program
— (Annual Report 1973-74)
September 1974

Description of the field and definition of the Program's objectives.

_____ copies at $3.00: $_____

A Perspective on Information Resources, The Year in Review
— (Annual Report 1973-74)
September 1974

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Legislative Compromise Techniques
Kurt Borchardt
September 1974

Discusses functions of legislative compromises and the processes by which they are reached, with many examples from Congressional proceedings. Suggests a framework for devising a theory of legislative compromise.

_____ copies at $2.25: $_____

Public Policy as a Determinant of Market Structure: The Case of the Specialized Communications Market
Peter D. Shapiro
September 1974

How public policy actions interact with other factors in the structuring of the specialized communications market: Hypotheses and preliminary findings.

_____ copies at $5.75: $_____

Transportation/Communication Considerations in the Location of Headquarters for Multi-Establishment Manufacturing Firms
Warren G. Lavey
August 1974

An examination of the importance of transportation/communications considerations on the location of corporate headquarters.

_____ copies at $1.75: $_____

Europe's Computer Industry: Closer to the Brink
Robert H. Hayes

An essay on the competitive status of the European computer industry and its options for the future.

A copy of this paper may be obtained from the *Columbia Journal of World Business*, 408 Uris Hall, Columbia University, New York, New York 10027. Vol. 9, #2, Summer 1974, price $1.50.

Toward A Quantification of the Information/Communication Industries
Warren G. Lavey
May 1974

A rough census of the information industries; preliminary attempts at comparison are made. This paper is also available through the National Technical Information Service, #PB-232548.

_____ copies at $3.75: $_____

City Meets the Cable: A Case Study of Cincinnati's Decision Process
Kas Kalba
March 1974

A case study of the cable TV decision process (well known for its high level of citizen participation) in Cincinnati. Some planning and policy implications of the findings are explored.

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Discussion Paper on Program Funding
February 1974

A paper discussing funding strategies and their relation to the Program's goals and structure.

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Will Information Technologies Help Learning?
Anthony G. Oettinger and Nikki Zapol
September 1972

How to meet the varied learning needs of people of all ages is a burning question of public policy. In the past two decades faith in advanced technology as an answer peaked, then receded. The question remains and so does the potential of technology. The paper analyzes the scientific, technological and economic limitations on the effectiveness of information technologies, and describes the impact on this effectiveness of policy issues in areas outside the "ed biz" — broad casting, libraries, postal services, publishers and others.

_____ copies at $1.75: $_____

In addition, notes were taken at the Faculty Seminars, and tape recordings were made of most of them. These are too informal to merit inclusion on any list of Program products. However, if any of the seminars listed on pages 25 and 28 of *A Perspective on Information Resources, The Year in Review* seem to be of special interest, we will deliver available notes or tapes for the cost of reproduction.

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